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PHYSICS ABSTRACTS

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SCIENCE ABSTRACTS—SECTION A

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ABSTRACTS 1501-1724

JULY, 1944 No. 559

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ERRATA

Abstr. 1044, line 4: *for* monograph *read* nomograph.

Abstr. 1230, line 9: *for* $y_p^2 1$ *read* $y_p^2 - 1$

for $y - \frac{3}{p} - 7_{yp}$ *read* $y_p^3 \rightarrow 7_{yp}$

513.3 : 548.1 *see Abstr.* 1709

517.512.2 : 518.4 : 621.317.35 1501

Fourier analysis by geometrical methods. WILLIAMS, H. P. *Wireless Engr*, 21, *pp.* 108–111, *March*, 1944.—[Abstr. 1370 B (1944)].

517.564.3 1502

A short table of the first five zeros of the transcendental equation $J_0(x)Y_0(kx) - J_0(kx)Y_0(x) = 0$. LOWAN, A. N., AND HILLMAN, A. *J. Math. Phys.*, 22, *pp.* 208–209, *Dec.*, 1943.—The zeros $x_1, \ldots, x_5$ are tabulated to 6 decimal places for $k = 1{\cdot}5(0{\cdot}5)4$. A table is also given of the values of $(k-1)x_i$ $(i = 1, \ldots, 5)$. This is very convenient for purposes of interpolation. L. S. G.

517.941.91 1503

On a non-linear differential equation of the second order. LEVINSON, N. *J. Math. Phys.*, 22, *pp.* 181–187, *Dec.*, 1943.—Concerning the equation $E: \ddot{x} + f(x)\dot{x} = e(t)$ where $e(t)$ is continuous, periodic and of least period L and $f(x)$ is continuous except possibly at discrete points where $f(x \pm 0)$ exists, the following result is proved: If $f(x) > 0$, except possibly at discrete points, a periodic solution of E, if it exists, is of period L and all other solutions tend to it as $t \to \infty$. A periodic solution certainly exists if $\int^{\infty} f(x)dx = \infty$. It is pointed out that this result is equally true for the equation $\ddot{u} + F(\dot{u}) + u = G(t)$ where $G(t)$ is periodic, of period L, and F' satisfies the same conditions as f. [See Abstr. 2661 (1943)]. L. S. G.

517.942.6 1504

Note on the function $F(a, b; c - n; z)$. BATEMAN, H. *Proc. Nat. Acad. Sci., Wash.*, 30, *pp.* 28–30, *Feb.*, 1944.—An estimate is obtained for the hypergeometric function $F(a, b; c - n; z)$ for large positive n and for some associated functions including that of Mittag-Leffler. [See Abstr. 324 (1943)]. L. S. G.

517.942.6 : 531.259 *see Abstr.* 1536

517.946.9 : 531.224 *see Abstr.* 1533

517.949 1505

Table of coefficients for inverse interpolation with central differences. SALZER, H. E. *J. Math. Phys.*, 22, *pp.* 210–224, *Dec.*, 1943.—A function $f(x)$ is tabulated at a uniform interval h of x. Suppose $f(\xi)$ is a given value of $f(x)$ lying between $f(x_0)$ and $f(x_1)$. The problem is to determine ξ, given $f(\xi)$. Let $\Delta = f(x_1) - f(x_0)$, $m = \{f(\xi) - f(x_0)\}/\Delta$ and $\xi = x_0 + ph$. Then, if δ_0^r and δ_1^r are the values of the linear differences in the rth column on the same row as $f(x_0)$ and $f(x_1)$, respectively, we have $p = m$ + 2nd-order terms + $A(m)\delta_0^4/\Delta + B(m)\delta_1^4/\Delta + C(m)\delta_0^4/\Delta^2 + D(m)\delta_1^4/\Delta^2 + E(m)\delta_0^2\delta_1^2/\Delta^2$ + 6th-order terms + ... The present tables give values of $A(m), \ldots, E(m)$ to 10 decimal places for $m = 0(0{\cdot}001)1{\cdot}000$. Ten 6th-order coefficients are also given for $m = 0(0{\cdot}1)1{\cdot}0$. There is a discussion of the error due to the neglect of terms of the 2nd or the 4th or the 6th orders. L. S. G.

518.12 1506

Seven-point Lagrangian integration formulae. BLANCH, G., AND RHODES, I. *J. Math. Phys.*, 22, *pp.* 204–207, *Dec.*, 1943.—It is required to integrate a function $f(x)$ over a range A. The latter is divided into several intervals and in each of these $f(x)$ is approximated by a polynomial of degree 6. Formulae are given (not involving differences) for $\int_A f(x)dx$ and these are more accurate than Simpson's rule. An example is given to illustrate the accuracy. L. S. G.

518.3 : 547.29 : 535.324 *see Abstr.* 1575

518.4 : 532.739.2 *see Abstr.* 1561

518.4 : 541.123.2 *see Abstr.* 1657

518.4 : 541.123.6 *see Abstr.* 1664

518.4 : 621.317.35 : 517.512.2 *see Abstr.* 1501

518.5 1507

The slide rule. A method of obtaining increased accuracy in reading and setting. HAY, G. A. *Wireless Engr*, 21, *pp.* 124–125, *March*, 1944.

518.5 : 621.3.011 1508

Impedance-problem solutions. PAINE, R. C. *Communications*, 23, *pp.* 58 *and* 60, *Dec.*, 1943.—[Abstr. 1107 B (1944)].

519.1 1509

Quasi-Latin squares in experimental arrangements. RAO, C. R. *Curr. Sci.*, 12, *pp.* 322–323, *Dec.*, 1943.

519.271 1510

Distribution of Fisher's g_1 for samples of three from a continuous rectangular distribution. SEKAR, C. C. *Curr. Sci.*, 13, *pp.* 10–11, *Jan.*, 1944.

519.41 1511

Relative number of non-invariant operators in a group. MILLER, G. A. *Proc. Nat. Acad. Sci., Wash.*, 30, *pp.* 25–27, *Feb.*, 1944.—A proof is given of the theorem: a non-Abelian group of order g cannot contain less than $3g/4$ non-invariant operators and a necessary and sufficient condition that there is at least 1 group of order g containing exactly $3g/4$ such operators is that $g \equiv 0(8)$. Extensions of the theorem are given and it is shown that there exists no group having exactly 3, 7 or 31 non-invariant operators, but there exists at least 1 non-Abelian group in which the number of such operators is any one of the primes 5, 11, 13, 17, 19, 23, 29. It is proved that every group in which the total number of non-invariant operators is a prime contains no invariant operators besides the identity. L. S. G.

522.2 1512

Calculation of the penetrating power of telescopes. GERSHUN, A. A. *C.R. (Doklady) Acad. Sci. URSS*, 34, 2, *pp.* 52–54, 1942.—An expression is given for the penetrating power of a telescope, i.e. the stellar magnitude at the limit of visibility, taking into account the brightness of the background. If the eye pupil is used at full, the penetrating power is determined entirely by the dia. of the objective or else by the magnification, according as the background is black or very bright. For the night sky, penetrating power is largely determined by the dia. of the objective, but the magnification has some effect. A. E. T.

523.11 1513

Galactic evidences for the time-scale of the universe. CHANDRASEKHAR, S. *Science*, 99, *pp.* 133–136,

Feb. 18, 1944.—Considerations of the stability of galactic clusters and of binary stars suggest a time-scale of 3×10^9 yr. and 10^{10} yr. (upper limit) respectively. Terrestrial rocks and meteorites give ages ranging from $1{\cdot}5$ to $3{\cdot}5 \times 10^9$ yr. The velocity interpretation of the nebular red-shift gives 2×10^9 yr. Work on the stability of clusters of extra-galactic nebulae suggests a mean life of 10^{11} yr. It is concluded that this agreement in order of magnitude cannot be accidental, and that a unit of time of some 3×10^9 yr. has a fundamental significance. A. HU.

523.672 1514

The spectrum of Comet Whipple–Fedtké–Tevzadze (1942 g). McKELLAR, A. *Astrophys. J.*, 99, *pp.*162–172, *March*, 1944.—Wavelength measurements are given from 8 high-purity spectrograms of the head of this comet in the photographic region. The *R* branch of the CN band at 3 883 Å, and several features (especially the main max. at 4 051 Å) of the CH_2 bands at 4 050 Å, are resolved. The emission at 4 752 Å is probably not due to $C^{13}C^{13}$, as in other comets. Wavelength coincidences with bands ascribed tentatively to SiO_2 are noted. A. HU.

523.672 1515

On the spectrum of Comet 1940 c. BOBROVNIKOFF, N. T. *Astrophys. J.*, 99, *pp.* 173–179, *March*, 1944.—Wavelength measurements are given from 2 high-dispersion spectrograms of the head of this comet in the photographic region. The structure of the main CN and C_2 bands is discussed. The observed fine structure of the 3 883 Å CN band is identified with certain groups of rotational lines, complete resolution not being possible. It is doubtful whether sharp lines in the Swan band at 4 737 Å are connected with the band. A. HU.

523.746 1516

Provisional sunspot-numbers for October to December, 1943. BRUNNER, W. *Terr. Magn. Atmos. Elect.*, 49, *p.* 46, *March*, 1944.

523.746 : 550.384 *see Abstr.* 1714

523.823 1517

Colour indices of proper-motion stars. LUYTEN, W. J., JOSE, P. D., AND FOSTER, J. F. *Astrophys. J.*, 99, *p.* 244, *March*, 1944.—Data are given for 6 stars of large proper motion whose colour indices are so small that they are probably either white dwarfs or "intermediates." A. HU.

523.838 : 523.877 *see Abstr.* 1531

523.841.3 1518

Variable stars in MWF 183. SWOPE, H. H. *Ann. Harv. Coll. Obs.*, 109, 9, *pp.* 31–39, 1943.—Comparison of 30 negatives with 5 positives of this field yields 125 new variable stars, for which data are given. Their distribution is typical of low-latitude fields near the galactic centre: they are mostly eclipsing variables, and there is a marked paucity of cluster-type variables. The mean magnitude at max. is high. A. HU.

523.841.3 1519

Variable stars in the southern third of MWF 187. SWOPE, H. H. *Ann. Harv. Coll. Obs.*, 109, 9, *pp.* 41–43, 1943.—Data are given for 239 variables in 20 sq. degs. of this field. Long-period and cluster-type variables predominate A. HU.

523.841.3 1520

Observations of variable stars by the American Association of Variable Star Observers. CAMPBELL, L. *Ann. Harv. Coll. Obs.*, 110, 5, *pp.* 153–177, *and* 110, 6, *pp.* 179–216, 1943.—Observations made betw. Dec., 1940, and Sept., 1941, are given. The stars are classified as long-period or rapidly varying irregular variables. A. HU.

523.841.9 1521

The spectrographic problem of U Cephei. STRUVE, O. *Astrophys. J.*, 99, *pp.* 222–238, *March*, 1944.—New radial-velocity observations confirm that the velocity curve is unsymmetrical and completely at variance with the photometric elements. Observations during the partial phase give an equatorial rotation velocity of 200 km./sec. ($>$ the orbital velocity) for the B8 star, and of only 50 km./sec. for the G2 star, in spite of its larger size. It is suggested that the velocity curve is distorted by gaseous currents as in SX Cass [Abstr. 1251 (1944)], these being also responsible for the appearance during the partial phases of sharp lines of H and Ca displaced from those arising in the limbs of the B8 star. The lines of He I confirm the conclusion that lines broadened by Stark effect are weakened at the limb; but those of Ca II do not change in equivalent width. This is interpreted as an absolute magnitude (i.e. pressure) effect, and not as evidence that the B8 lines are produced by a pure absorption mechanism. A. HU.

523.841.9 1522

Note on the problem of U Cephei. KOPAL, Z. *Astrophys. J.*, 99, *pp.* 239–243, *March*, 1944.—Several spectroscopic binaries have appreciable spectroscopic eccentricities while their photometric orbits are circular. Reasons are given for attributing the distortion of the velocity curves to causes in the outer parts of the stars concerned, where the density is so low that the mass distribution remains unaffected. The asymmetry of the light curve of U Ceph is attributed to a mechanism proposed by Cowling [Abstr. 981 (1942)]. A. HU.

523.842.3 1523

The system of β Coronae Borealis. NEUBAUER, F. J. *Astrophys. J.*, 99, *pp.* 134–144, *March*, 1944.—From 341 spectrograms of this spectroscopic binary, secured in the period 1931–1942 on a 3-prism spectrograph, elements of the velocity orbit are derived. A main period of $10{\cdot}5$ yr. is established, with some evidence for a secondary period of 320 days. A. HU.

523.842.3 1524

New orbits for the spectroscopic binaries HD 163181 and HD 78316 (76 κ Cancri). STRUVE, O. *Astrophys. J.*, 99, *pp.* 210–221, *March*, 1944.—Spectroscopic orbits are derived for these stars. The first is also an eclipsing binary, and the velocity curve shows a conspicuous rotation effect ± 1 days from secondary min. The system consists of a B giant with strong absorption lines and another giant with a spectrum showing continuous and line emission but no absorption lines. The spectrum of κ Canc shows abnormally strong Mn II lines, but no secondary spectrum appears. A. HU.

523.854.12 1525

Analysis of the Milky Way in Cassiopeia. BAKER, R. H., AND NANTKES, E. *Astrophys. J.*, 99, *pp.* 125

133, *March*, 1944.—Star counts to magnitude 15, colour excesses and counts of extragalactic nebulae are used to investigate obscuration in the region betw. + 1° and − 34° galactic lat. and 75° and 105° galactic long. The absorption is ascribed to 2 cloud systems: one at 500 parsecs which causes the non-uniform appearance of the region, and one at 800 parsecs which is nearly uniform throughout the low latitudes. A const. coefficient of absorption will, however, represent the observed star-counts and colours equally well. The density gradient is negative with increasing distance from the Sun. A. HU.

523.872 1526

Rapid changes in the spectrum of HD 218393. STRUVE, O. *Astrophys. J.*, 99, *pp.* 75–83, *Jan.*, 1944.—Observations made in the summer of 1943 show a series of changes which resemble those in AX Mono [Abstr. 60 (1944)]. The changes, which are recorded in detail, suggest that the star is a rapidly rotating main-sequence object of early B type with exceptionally powerful prominence activity which has resulted in the formation of a shell of gas in which originate most of the spectral lines. A. HU.

523.872 1527

A note on the shell spectrum of 48 Librae. HILTNER, W. A. *Astrophys. J.*, 99, *pp.* 103–106, *Jan.*, 1944.—The work of Struve [Abstr. 2507 (1943)] is extended, and it is found that all the shell lines, weak as well as strong, in this spectrum are unsymmetrical, showing sharp red edges and diffuse violet ones. The velocity of expansion of the shell is thus probably not uniform. A pronounced difference in profile for different elements is attributed to stratification. A. HU.

523.872 : 535.338.334 1528

Notes on the theory of non-coherent scattering. SPITZER, L. *Astrophys. J.*, 99, *pp.* 1–7, *Jan.*, 1944.—It is shown theoretically that non-coherent scattering should occur, partly or wholly, in the formation of almost all absorption lines of astrophysical importance. The effect of the process on line profiles is discussed: though no large change in the curve of growth is to be expected, the cores of strong lines will be sharper than on the theory of coherent scattering by an amount which diminishes towards the limb. Observed profiles of H lines in early-type stars and of Na lines in the Sun are qualitatively consistent with the new theory. A. HU.

523.876 1529

Radial velocities of 283 stars of spectral classes R and N. SANFORD, R. F. *Astrophys. J.*, 99, *pp.* 145–161, *March*, 1944.—A table is given of the radial velocities, determined at low dispersion, for 283 R- and N-type stars. The emission-line velocity is 20 km./sec. smaller than the absorption-line velocity in 34 *Ne* stars. Galactic concentration is much greater for N stars than for R stars. The galactic rotation effect is used to obtain mean absolute magnitudes of $-2{\cdot}3 \pm 0{\cdot}2$ for N stars and $-0{\cdot}4 \pm 0{\cdot}4$ for R stars. These values are confirmed by distances obtained for a few stars whose radial velocities are large enough to separate the interstellar from the stellar *D* lines. A. HU.

523.877 1530

On the radiative equilibrium of a stellar atmosphere. CHANDRASEKHAR, S. *Astrophys. J.*, 99, *pp.* 180–190, *March*, 1944.—The equation of transfer is solved by expanding the expression for the outgoing intensity in terms of spherical harmonics, and it is shown how successively higher approximations to the solution are obtained by retaining more terms in the expansion. The first 3 approximations are obtained, and the corresponding laws of darkening toward the limb are derived. A comparison of these laws with the exact form on Hopf's theory indicates satisfactory agreement and a rapid convergence. A. HU.

523.877 : 523.838 1531

Stellar rotation and large-scale currents. KROGDAHL, W. *Astrophys. J.*, 99, *pp.* 191–204, *March*, 1944.—The problem of finding a system of axially symmetrical currents which can or must exist in a rotating star is considered. Reasons are given for confining the discussion to viscous stars. In these, rotation will cause meridional currents which in turn cause a differential rotation. A formal solution for the differential rotation velocity is given in terms of the meridional velocities, and the equations to be satisfied by the latter are derived, an approx. method for their solution being suggested. A. HU.

530.12 1532

Relativity and supplementary indeterminacy. WATAGHIN, G. *Phys. Rev.*, 65, *p.* 205, *March* 1 *and* 15, 1944.

530.15 : 538.32 *see Abstr.* 1632

531.224 : 517.946.9 1533

On the stress distribution in cantilever beams. HILDEBRAND, F. B. *J. Math. Phys.*, 22, *pp.* 188–203, *Dec.*, 1943.—An exact solution is obtained of the problem of determining the state of stress in a cantilever beam (flanged or unflanged) with narrow rectangular cross-section, under a prescribed transverse loading in the plane of the web plate, which is assumed to be perfectly rigid in the direction of the applied loading. The final result for the stress function is $H(x, y) = F_e(x, y) + \sum_{n=1}^{\infty} (A_n \sinh \mu_n x/l + B_n \cosh \mu_n x/l) Y_n(y)$ where $F_e(x, y)$ is a certain function, $Y_n(y) = C_n\left(\cos\frac{\lambda_n y}{h} - \frac{\sin \lambda_n}{\lambda_n}\right)$ and $\mu_n = \lambda_n \times$ const. and the $\lambda_n (n = 1, 2, 3, \ldots)$ are solutions of $\tan \lambda_n = \lambda_n/(1 + \alpha\lambda_n^2)$. Values of λ_n are given for $n = 1, 2, \ldots, 10$ and $\alpha = 0, 0{\cdot}1, 1, 5, \infty$. The solution is compared with one obtained earlier [Abstr. 52 (1943)] by the method of least work. Information is thereby derived concerning the accuracy of the latter method. [See Abstr. 3066 (1940)]. L. S. G.

531.225 1534

The effects of web deformation on the torsion of I-beams. GOODIER, J. N., AND BARTON, M. V. *J. Appl. Mech.*, 11, *A35–A40*, *March*, 1944.—An analysis of the I-beam in non-uniform torsion is made, incl. bending of the flanges in their own planes and deformation of the web cross-section. This extends the theory to thinner webs and permits the satisfaction of more general end conditions. Numerical examples worked out for 3 sections, differing in web thickness only, show that the stress and deformation are significantly modified by the web flexibility when the web is sufficiently thin, and that there are then bending stresses in the web which may be larger than the

bending stresses in the flanges. Only the unbuckled state of the web is considered.

531.226 1535

The stresses in cemented joints. GOLAND, M., AND REISSNER, E. *J. Appl. Mech.*, 11, *A17–A27*, *March*, 1944.—The problem is divided into (*a*) determination of the loads at the edges of the joint, (*b*) determination of the stresses in the joint due to the applied loads. Solutions are obtained for the cases (1) where the cement layer is so thin that its effect on the flexibility of the joint may be neglected, and (2) where the joint flexibility is mainly due to that of the cement layer. In both cases expressions are obtained for the shearing stresses in the cement, and for the normal stresses in a direction $\perp$ the plane of the joint.

531.259 : 517.942.6 1536

Stress coefficients for rotating discs of conical profile. BISSHOPP, K. E. *J. Appl. Mech.*, 11, *A1–A9*, *March*, 1944.—The solution involves calculations with infinite series which satisfy a hypergeometric differential equation of exponent difference 2. Numerical evaluation of the coefficients is facilitated by employing the linear relations between the hypergeometric functions of arguments x and $1 - x$. These relations are derived. The formulae obtained were used to compile tables of the hypergeometric function and the related stress coefficients for various values of Poisson's ratio.

531.717.1 : 535.34 : 545.82 1537

Infra-red absorption cells and measurement of cell thickness. SMITH, D. C., AND MILLER, E. C. *J. Opt. Soc. Amer.*, 34, *pp.* 130–134, *March*, 1944.—Two types of cell suitable for quantitative infra-red analysis are described, one being of const. thickness whilst the other is a precision variable type for volatile liquids. The methods described for determination of the cell thickness include micrometer and microscopic methods, the use of concentrated liquids in thin cells and comparison with dilute liquids in thick cells, and the use of interference fringes. A. H.

531.754.4 1538

Pycnometer for volatile liquids. LIPKIN, M. R., DAVISON, J. A., HARVEY, W. T., AND KURTZ, S. S., JR. *Industr. Engng Chem.* (*Analyt. Edit.*), 16, *pp.* 55–58, *Jan.* 15, 1944.—Describes a pycnometer especially suited for the determination of density on 5 ml. of volatile liquid with an accuracy of $\pm$ 0·0001 g./ml.

531.756.4 1539

Specific gravity of butadiene. DEAN, M. R., AND LEGATSKI, T. W. *Industr. Engng Chem.* (*Analyt. Edit.*), 16, *pp.* 7–8, *Jan.* 15, 1944.—The specific gravities (t/60°F.) of 1,3-butadiene of 99·6 mole % purity were determined for the range $-17·78°$ to 60°C. by a specially constructed steel pycnometer of approx. 4 500 cm.^{3} capacity and capable of withstanding the resultant v.p. The best value for the sp. gr. (60°/60°F.) was estimated to be 0·6274 $\pm$ 0·00015.

531.76 : 542.1 1540

A laboratory timing clock. SMITH, G. F. *J. Chem. Soc.*, *p.* 113, *March*, 1944.—The clock allows the timing of any number of successive events to about 0·5 sec.

531.76 : 621.317.39 1541

A review of various electrical methods for the measurement of short time intervals. THURLBY, L. T. *Beama J.*, 51, *pp.* 126–130, *April*, 1944.—[Abstr. 1373 B (1944)].

531.761 : 621.317.39 1542

Electronic timer for microsecond intervals. WEISZ, P. B. *Electronics*, 17, *pp.* 108–112, *April*, 1944.—[Abstr. 1374 B (1944)].

532.13 : 539.501 1543

Thermoplastic flow of polystyrene. FOOTE, N. M. *Industr. Engng Chem.*, 36, *pp.* 244–248, *March*, 1944.—Nomographs for calculating viscosity from data on parallel-plate compressions and from data on the filling of a capillary are utilized. The equation giving apparent viscosities of polystyrene for low stresses as a function of abs. temp. is $\ln\eta = (40\,000/RT) - 30$. Lowered apparent viscosities at higher stresses were observed.

532.13 : 541.132.3 : 532.613.4 : 541.182.4 *see Abstr.* 1693

532.133 : 532.14 : 541.265 : 532.614 *see Abstr.* 1551

532.133 : 541.182 : 537.36 *see Abstr.* 1614

532.133 : 547.215 1544

Viscosity of *n*-pentane. HUBBARD, R. M., AND BROWN, G. G. *Industr. Engng Chem.*, 35, *pp.* 1276–1280, *Dec.*, 1943.—The viscosity of *n*-pentane was determined with a rolling-ball viscometer in the range from 25° to 250°C. and up to 1 000 lb./in.^{2} The resulting values are given in tables, accurate within 5% up to 150°C. and within 10% at higher temperatures. A graphical comparison with data from the literature is shown.

532.14 : 535.324 : 541.123.4 *see Abstr.* 1663

532.14 : 541.265 : 532.133 : 532.614 *see Abstr.* 1551

532.14 : 547.2 : 536.42 : 541.66 *see Abstr.* 1701

532.517.4 : 532.72 1545

Eddy diffusion. KALINSKE, A. A., AND PIEN, C. L. *Industr. Engng Chem.*, 36, *pp.* 220–223, *March*, 1944.—The theory of eddy diffusion developed by Taylor [Abstr. 4101 (1935)] is confirmed by experiments on the diffusion of foreign material in a turbulent water stream. A technique for determining directly the eddy diffusion coeff. in flowing water was developed, and the method can be readily adapted to gases. The scale of the turbulence enters directly into the eddy diffusion relationship.

532.532 1546

Weir flow in overflowing tanks. KAMMERMEYER, K. *Industr. Engng Chem.*, 36, *pp.* 202–204, *March*, 1944.—Analysis of data on weirs flowing at extremely low heads permits the establishment of a simple equation relating the flow per unit length of weir with the head of liquid over the weir by a straight-line relation. This equation is recommended for weir heads up to 0·03 ft.

532.612.4 : 532.63 : 541.183.26 1547

Hysteresis and the capillary theory of adsorption of vapours. COHAN, L. H. *J. Amer. Chem. Soc.*, 66, *pp.* 98–105, *Jan.*, 1944.—Predictions based on the capillary theory of adsorption and the open-pore theory of hysteresis agree with experimental data. The agreement indicates that the capillary theory of

adsorption which postulates the formation of a monomolecular layer followed by capillary condensation is a first approximation for the adsorption mechanism in the systems considered. The surface tension and molal vol. of a liquid confined in a capillary of radius = 2 × mol. dia. appear to be the same as for the liquid in bulk.

532.612.4 : 532.77 1548

Surface tension and activity of sulphur dioxide solutions of potassium thiocyanate. EVERSOLE, W. G., HART, T. F., AND WAGNER, G. H. *J. Phys. Chem.*, 47, *pp.* 703–709, *Dec.*, 1943.—The activity coefficients of KCNS in liquid SO_2 at 15°, 20° and 25°C. were determined from v.p. measurements. Surface-tension measurements for these solutions were extended to lower conc. (0·0001 molal) than previously reported. The "Jones–Ray" min. was not observed. The agreement between the experimental results and the Onsager–Samaras equation is only qualitative. [See Abstr. 1028 (1942)]. Tables of results are given.

532.613.4 1549

Note on Antonoff's rule. ANTONOFF, G. *J. Phys. Chem.*, 47, *pp.* 709–710, *Dec.*, 1943.—A reply. [See Abstr. 2527 (1943)].

532.613.4 1550

Note on Antonoff's so-called rule. CUPPLES, H. L. *J. Phys. Chem.*, 48, *pp.* 75–76, *March*, 1944.—[See Abstr. 2527 (1943)].

532.613.4 : 532.13 : 541.132.3 : 541.182.4 *see Abstr.* 1693

532.614 : 532.133 : 532.14 : 541.265 1551

Molecular surface energy of sulphur dioxide addition compounds. III. JASPER, J. J., AND BRIGHT, J. R. *J. Amer. Chem. Soc.*, 66, *pp.* 105–106, *Jan.*, 1944.—[See Abstr. 2525 (1943)]. The effect of temperature on the mol. surface energy of $(C_3H_7)_3N : SO_2$, and the equi-molar mixture of $(C_4H_9)_3N$ and SO_2 was determined. Data are presented for the density, surface tension and viscosity over the range 17°–45° for the former and 0–40° for the latter. The Eötvös constants were calculated and found to be < any of the lower mol. wt. addition compounds studied. The temp. coeff. of the mol. surface energy seems to decrease with increasing mol. wt. of the addition compounds, and the tendency to associate increases. Parachor data furnish additional evidence for the existence of a N–O–S linkage in this type of compound.

532.614 : 532.62 : 536.658 1552

The decrease (π) of free surface energy (γ) as a basis for the development of equations for adsorption isotherms; and the existence of two condensed phases in films on solids. HARKINS, W. D., AND JURA, G. *J. Chem. Phys.*, 12, *pp.* 112–113, *March*, 1944.

532.62 1553

The existence of expanded and intermediate phases in films on solids. JURA, G., AND HARKINS, W. D. *J. Chem. Phys.*, 12, *p.* 114, *March*, 1944.

532.62 : 536.658 1554

Equations for the pressure(π)/area(σ) relations (isotherms) of liquid expanded and intermediate monolayers on water. JURA, G., AND HARKINS, W. D. *J. Chem. Phys.*, 12, *pp.* 113–114, *March*, 1944.

532.62 : 536.658 : 532.614 *see Abstr.* 1552

532.62 : 536.71 : 536.658 *see Abstr.* 1606

532.63 : 541.183.26 : 532.612.4 *see Abstr.* 1547

532.692 : 541.182.4 = 3 1555

Film formation in emulsions. II. WAGNER, H., AND BÖHNISCH, A. W. *Kolloid Z.*, 100, *pp.* 263–274, *Aug.*, 1942.—[See Abstr. 5447 (1936)]. Structure and properties of films formed by organic substances, e.g. linseed oil, chlorinated caoutchouc or buna and vinyl resins, in oil-in-water and water-in-oil emulsions with or without an emulgator are investigated. The testing method is described in detail and the results of the investigations are tabulated. Stability of the emulsion and of the film, and ageing properties, are discussed.

R. N.

532.694.1 : 541.182 *see Abstr.* 1690

532.72 : 532.517.4 *see Abstr.* 1545

532.73 1556

Mechanism of solvent action. DOOLITTLE, A. K. *Industr. Engng Chem.*, 36, *pp.* 239–244, *March*, 1944.—Two principal equilibria are simultaneously operative in the solution of resinous substances—solvation-desolvation and aggregation-disgregation. The rate of desolvation is fixed at const. temp., but the rate of solvation is a function of solvent conc. The threshold conc. required to initiate the solution process diminishes to a const. min. as we ascend a homologous series of solvents. This min. (class threshold conc.) is independent of the diluent. The aggregation-disgregation equilibrium of the solute macromolecules depends on the solvation-desolvation equilibrium. In fluid solutions, the extent of aggregation of the solute macromolecules increases linearly with decrease in solvent conc., but as solvent conc. approaches the threshold value, desolvation permits aggregation at multiple points of contact. The result is either gelation or precipitation. In film formation, the high viscosity obstructs the tendency of the macromolecules to unite at the max. number of points of contact. Plasticization prevents complete desolvation of the resin.

532.739.2 1557

Solubility of ammonium persulphate in water and in solutions of sulphuric acid and ammonium sulphate. GALL, J. F., CHURCH, G. L., AND BROWN, R. L. *J. Phys. Chem.*, 47, *pp.* 645–649, *Dec.*, 1943.—A method for accurate determination of solubility in slowly hydrolysing and decomposing solutions of per compounds was developed. The solubility of $(NH_4)_2S_2O_8$ in water and in solutions of H_2SO_4 and $(NH_4)_2SO_4$, at 15° and 20°C., was measured.

532.739.2 1558

The solubility of naphthalene in aqueous solutions of methanol, ethanol, 1-propanol, and 1-butanol at several temperatures. MANNHARDT, O. W., RIGHT, R. E. DE, MARTIN, W. H., BURMASTER, C. F., AND WADT, W. F. *J. Phys. Chem.*, 47, *pp.* 685–702, *Dec.*, 1943.—Over 200 determinations of the upper or, within the solubility gap, the upper 2 transformations using the synthetic method were made on 4 naphthalene–water–aliphatic-alcohol systems. Equations are given for ternary ditectic surfaces. The 3-phase monotectic equilibrium curves were determined and quantities derivable from the curve for the system involving ethanol are given. The general course of the ternary dichortic surfaces is established.

532.739.2 1559

Solubility of water in liquid carbon dioxide. STONE, H. W. *Industr. Engng Chem.*, 35, *pp.* 1284–1286, *Dec.*, 1943.—The solubility of water in liquid CO_2 is reported from $-29°$ to $+22·6°C.$, involving a v.p. range for CO_2 of 15 to 60 atm. The values indicate a regular increase in solubility from 0·02% H_2O at the lower temp. to 0·10% at the higher.

532.739.2 1560

The solubility of sodium iodide in sodium hydroxide solutions at 20°. POMEROY, R., AND KIRSCHMAN, H. D. *J. Amer. Chem. Soc.*, 66, *pp.* 178–179, *Feb.*, 1944.—The solubility of NaI at 20° was determined in NaOH solutions from 0 to 15·21 *N* in alkali. The density and solubility curves show a discontinuity at a point corresp. to 8·20 *N* in NaOH and 6·92 *N* in NaI, which point marks the transition from the dihydrate to anhydrous NaI.

532.739.2 : 518.4 1561

Line co-ordinate representation of solubility curves. GERMANN, F. E. E., AND GERMANN, R. P. *Industr. Engng Chem.*, 36, *pp.* 93–96, *Jan.*, 1944.

532.739.2 : 536.7 : 541.134 *see Abstr.* 1684

532.77 : 532.612.4 *see Abstr.* 1548

532.77 : 536.7 : 541.64 1562

Thermodynamics of heterogeneous polymer solutions. FLORY, P. J. *J. Chem. Phys.*, 12, *pp.* 114–115, *March*, 1944.

533.12 : 536.655 : 535.32 : 547.412.63 : 536.423.15 *see Abstr.* 1599

533.52 1563

Some improvements to the Töpler pump. PURUSHOTHAM, A. *Curr. Sci.*, 13, *p.* 15, *Jan.*, 1944.

534.13 1564

The equation of motion of a geophone on the surface of an elastic earth. WOLF, A. *Geophysics*, 9, *pp.* 29–35, *Jan.*, 1944.—The motion of a geophone case on the surface of an elastic earth is not the same as the motion of the earth at high frequencies, and the problem is considered as that of a weight placed on the surface of an elastic solid. Equations are developed from which the frequency of oscillation and the decrement of the system are determined. G. E. A.

534.143 : 620.179.16 : 534.321.9 *see Abstr.* 1567

534.213.4 : 534.321.9 1565

On supersonic waves in cylindrical tubes and the theory of the acoustic interferometer. KRASNOOSHKIN, P. E. *Phys. Rev.*, 65, *pp.* 190–195, *March* 1 *and* 15, 1944.—The quartz-plate radiator does not give rise to purely plane waves, and a theory is developed which takes into account this non-uniformity of the acoustic field. An explanation is given of the satellite peaks observed by Pielemeier and others, and an improved formula is found for the determination of the absorption coefficient. G. E. A.

534.25 : 534.321.9 1566

Refraction of ultrasonics and velocities in coloured liquids and in solids. PARSHAD, R. *Curr. Sci.*, 13, *pp.* 13–14, *Jan.*, 1944.

534.321.9 : 534.143 : 620.179.16 1567

Magnetostriction and supersonics. HUTTER, H. E. *Elect. Times*, 105, *pp.* 368–369, *March* 30, 1944.—A general explanation of ultrasonics, their properties and production by the magnetostriction generator, is given. The different types of magnetostriction transmitters (rods, strips and cylindrical types) are discussed. Applications are described: the examination of motor tyres, the tinning of Al sheet, the production of self-lubricating bronze bearings and the formation of emulsions. M.-V.

534.321.9 : 534.213.4 *see Abstr.* 1565

534.321.9 : 534.25 *see Abstr.* 1566

534.372 : 621.8 1568

Pi-Tee transformations in the analysis of mechanical transmission lines. HORVAY, G., AND PINES, S. *J. Appl. Mech.*, 11, *A41–A46, March*, 1944.—In π-T transformations the solution of the vibration problem of a shaft system is facilitated by the replacement of certain portions of the system by simpler dynamical equivalents; the transformation consists in substituting an electrical system for the mechanical one. A method is given which simplifies the analysis of mechanical transmission systems without using the electrical analogies. The method is applied to the problem of the viscous vibration damper. G. E. A.

534.861.1 1569

Acoustical design and treatment for speech broadcast studios. CONTENT, E. J., AND GREEN, L., JR. *Proc. Inst. Radio Engrs, N.Y.*, 32, *pp.* 72–77, *Feb.*, 1944.—A studio designed for good music conditions will not give the best conditions for speech. The authors achieve these conditions by using materials, distributed in small panels at different small slopes, which lower the time of reverberation of the studio for l.f. and raise it for h.f., and the standing waves in the studio are broken up to such an extent as not to be objectionable. The basis of the panel materials is rock wool of different densities and thicknesses. G. E. A.

535.13 : 535.3 1570

Dispersion curves of the semi-conductors according to the Maxwell theory. ARKADIEV, V. K. *C.R. (Doklady) Acad. Sci., URSS*, 34, 2, *pp.* 58–61, 1942.—Curves are plotted showing the refraction coeff., absorption coeff., absorption index and reflection factor as functions of the period, in the case of rain water, aq. solution of NaCl, Hg, Fe and Cu. The dispersion curves of the semi-conductors are also plotted on a basis of T/T^*, where T^* is the characteristic period of the semi-conductor. The results are discussed. A. E. T.

535.215 : 537.525.8 1571

New light-effect-intensity variation by direct photoelectric measurements. DEO, P. G. *Curr. Sci.*, 13, *p.* 44, *Feb.*, 1944.—[See Abstr. 1614 (1943)].

535.23 : 537.122 *see Abstr.* 1610

535.243 : 535.375.51 : 535.338.42 : 541.132 *see Abstr.* 1677

535.247.4 : 621.383 1572

A photo-electric device for recording variations in the concentration of a coloured solution. DAVENPORT, T. B. *J. Sci. Instrum.*, 21, *pp.* 84–86, *May*, 1944.—[Abstr. 1433 B (1944)].

535.3 : 535.13 *see Abstr.* 1570

535.32 : 533.12 : 547.412.63 : 536.655 : 536.423.15 *see Abstr.* 1599

535.321.5 1573

A precision apparatus for the rapid determination of indices of refraction and dispersion by immersion. FAICK, C. A., AND FONOROFF, B. *J. Res. Nat. Bur. Stand., Wash.*, 32, *pp.* 67–75, *Feb.*, 1944.—A new immersion method for determining indices of refraction and ν-values, employing the double-diaphragm method for securing oblique illumination, is described. The average error based upon 144 measurements is 2×10^{-5}; the max. error is 5×10^{-5}.

535.324 1574

Refractive indices of the normal saturated aliphatic nitriles. DORINSON, A., AND RALSTON, A. W. *J. Amer. Chem. Soc.*, 66, *pp.* 361–362, *March*, 1944.—The refr. indices of the normal aliphatic nitriles from butyronitrile to stearonitrile incl. were determined betw. 20° and 75°. For each nitrile an abrupt change of slope in the refr. index *v.* temp. curve occurs at 40°–45°. Corresponding graphs of the mol. refractivities also show a change of slope.

535.324 : 532.14 : 541.123.4 *see Abstr.* 1663

535.324 : 547.29 : 518.3 1575

Refractive-index nomograph for liquid fatty acids. DAVIS, D. S. *Industr. Engng Chem.*, 35, *p.* 1302, *Dec.*, 1943.

535.338 1576

Direct derivation of Balmer spectra. KOSAMBI, D. D. *Curr. Sci.*, 13, *pp.* 71–72, *March*, 1944.

535.338 : 537.531 *see Abstr.* 1619

535.338.3 : 537.531 *see Abstr.* 1620

535.338.3 : 546.14 1577

Structure of the second spark spectrum of bromine–Br III. RAO, K. R. *Curr. Sci.*, 13, *p.* 72, *March*, 1944.

535.338.334 : 523.872 *see Abstr.* 1528

535.338.42 : 535.243 : 535.375.51 : 541.132 *see Abstr.* 1677

535.34 : 545.82 : 531.717.1 *see Abstr.* 1537

535.341 : 541.182.6 1578

Absorption of light in soap solutions. MCBAIN, M. E. L. *J. Phys. Chem.*, 48, *pp.* 89–95, *March*, 1944.—The apparent failure of solutions of sodium oleate regularly to obey Beer's law of absorption in the ultra-violet is due to orientation of the colloidal micelles through previous flow of the liquid. Other scattered observations likewise show that the absorption of light by some molecules depends upon the direction in which the light passes through them.

535.342 : 541.65 = 3 1579

On the mutual influence of chromophoric groups by systems with a closed group of π-electrons. (Complete analysis of absorption spectra VII). HERTEL, E., AND SIEGEL, U. *Z. phys. Chem. B*, 52, *pp.* 167–183, *Sept.*, 1942.—A mutual effect of 2 azo groups connected by a benzene or naphthalene ring causing a shift to higher wavelengths is made possible by the system of π-electrons, even when a connection of the chromophoric groups through a system of conjugated double bonds appears impossible. Absorption spectra are given for some azo and diazo derivatives of naphthalenes and their preparation is described. R. N.

535.343 : 541.634 *see Abstr.* 1700

535.343 : 547.458.6 1580

Relation of starch-iodine absorption spectra to the structure of starch and starch components. BALDWIN, R. R., BEAR, R. S., AND RUNDLE, R. E. *J. Amer. Chem. Soc.*, 66, *pp.* 111–115, *Jan.*, 1944.—Absorption spectra confirm the great difference in behaviour of amylose and amylopectin with I found by the potentiometric I titration, and provide another means of analysing for the two components in whole starch. The amount of I bound in complex formation with amylose increases as the conc. of I decreases, becoming one I mol. for 6 glucose residues for infinitely dil. I solutions. The λ of max. absorption of an amylose solution shifts towards the red as the chain length of the amylose increases; the shift is in the same direction when the lengths of the unbranched portions of an amylopectin are increased. The mol. extinction coeff. increases in similar cases. Both these properties permit the relative evaluation of mol. wt. of an amylose and the degree of branching of an amylopectin.

N. M. B.

535.37 1581

The low-temperature yellow zinc silicate phosphor. FROELICH, H. C. *J. Phys. Chem.*, 47, *pp.* 669–677, *Dec.*, 1943.—An important step in the formation of a Zn silicate phosphor is the production of the oxide or silicate of Mn in its bivalent state. If this step is eliminated as a variable in the phosphor preparation, such as by preformation of Mn silicate at low temp., yellow phosphors of high brightness may be obtained. Steam is a good gaseous catalyst for the reaction, which must be carried out in the complete absence of O_2.

535.372 : 547.979.7 1582

Studies on the fluorescence of chlorophyll. The effects of concentration, temperature, and solvent. ZSCHEILE, F. P., AND HARRIS, D. G. *J. Phys. Chem.*, 47, *pp.* 623–637, *Dec.*, 1943.—A fluorescence photoelectric spectrophotometer was employed. The effects of conc. and thickness of solution were studied in rel. to the apparent wavelength of the major fluorescence max. Errors due to re-absorption and to decrease of fluorescence intensity with time of irradiation were minimized by the use of a special capillary cell. The fluorescence spectra of chlorophyll *a* in 13 solvents were determined. Component *b* was studied in ethyl ether. The fluorescence max. of *a* in either solution was shifted to the red and the max. intensity was increased with decreasing temperature. Filtered radiation from either an incandescent source or a mercury arc produced the same fluorescence spectrum as did general radiation from these sources.

535.375.5 = 3 1583

Studies on the Raman effect. Communication 136: Nitrogen bodies. XXIV: Alkyl nitrates. WITTEK, H. *Z. phys. Chem. B.*, 52, *pp.* 153–166, *Sept.*, 1942.—Raman spectra and polarization properties are determined for some alkyl nitrates and conclusions are drawn regarding the structure and the valency angles of the groups C . NO_2 and O . NO_2. R. N.

535.375.51 1584

Raman frequencies of calcite. BHAGAVANTAM, S., AND RAO, B. S. R. *Curr. Sci.*, 13, *pp.* 12–13, *Jan.*, 1944.

535.375.51 1585

Raman spectra of two forms of *allo*-ocimene. HOPFIELD, J. J., HALL, S. A., AND GOLDBLATT, L. A. *J. Amer. Chem. Soc.*, 66, *pp.* 115–118, *Jan.*, 1944.—Two forms of *allo*-ocimene, designated as A- and B-, were isolated. Both forms give strong Raman spectra in an exceptionally short exposure time. Each may be detected in a mixture by the characteristic Raman lines at 1 365 cm.$^{-1}$ (A-form) and 1 272 cm.$^{-1}$ (B-form). The Raman spectra tend to support the interpretation that these forms are two of the four possible geometric stereoisomers of *allo*-ocimene.

535.375.51 : 535.338.42 : 535.243 : 541.132
see Abstr. 1677

535.393 : 535.843.2 *see Abstr.* 1595

535.412 1586

New contributions to interferometry. I. RAMAN, C. V., TUCKERMAN, L. B., TOLANSKY, S. *Phil. Mag.*, 35, *pp.* 210–213, *March*, 1944.—Correspondence. [Abstr. 2781 (1943)].

535.417 : 539.211 : 548.0 1587

An interferometric procedure for the examination of crystal surfaces. SIEGBAHN, M., TOLANSKY, S. *Nature, Lond.*, 153, *p.* 435, *April* 8, 1944.—[See Abstr. 380, 1201 (1944)].

535.417 : 541.183.022 : 539.13 : 547.962.3 = 3 1588

On the interferometric measurement of film thickness on monomolecular adsorbed layers of albumin. TRURNIT, H. J., AND BERGOLD, G. *Kolloid Z.*, 100, *pp.* 177–191, *Aug.*, 1942.—Size and shape of albumin molecules are determined by the optical investigation of monomolecular layers adsorbed on carrier plates prepared by Blodgett and Langmuir's method. The method of measurement is described in detail and illustrated. Yellow ferment, haemocyanine and virus proteins of insects, were investigated. The results of the measurements are compared with those obtained by other (supermicroscopic) methods. R. N.

535.417 : 620.179.6 1589

Interference-band inspection of surface finish. *Engineering*, 157, *pp.* 205–207, *March* 17, 1944.—[Abstr. 1291 B (1944)].

535.43 : 537.531 *see Abstr.* 1621

535.551 : 541.182.5 = 3 1590

On a new kind of double refraction in orientated gels. VERMAAS, D. *Z. phys. Chem. B*, 52, *pp.* 131–141, *Sept.*, 1942.—Double-refraction phenomena observed on swollen or imbibed gels show, besides the proper double refraction, that caused by tension and that caused by barlike structure, a 4th kind caused by the orientated molecules of the imbibition liquid. The name adsorptional double refraction is proposed, and its dependence on the degree of swelling is determined by experiment. [See Abstr. 675 (1944)]. R. N.

535.6.08 1591

Colour of aqueous potassium dichromate solutions. KITSON, R. E., WITH MELLON, M. G. *Industr. Engng Chem.* (*Analyt. Edit.*), 16, *pp.* 42–44, *Jan.* 15, 1944.—A spectrophotometric study was made of the colour of aq. $K_2Cr_2O_7$ solutions, incl. the effect of *p*H and of the conc. of acid, base and dichromate. Any recommendations of $K_2Cr_2O_7$ solutions as permanent colorimetric standards should specify the exact nature of the solution.

535.7 : 535.8 1592

Visibility of details as a basis for estimation of optical instruments. GERSHUN, A. A. *C.R.* (*Doklady*) *Acad. Sci. URSS*, 34, 1, *pp.* 19–21, 1942.—The various parameters determining the visibility of an object when viewed through an optical system are considered. This leads to a method for the calculation of the resolving power of an optical instrument at low intensities of illumination, when the resolving power is limited by the properties of the eye, rather than by defects of the image, as in the case with high intensities. The present importance of the work is in connection with optical instruments intended for use at night. A. E. T.

535.733.1 1593

The development of the trichromatic theory of colour vision. PEDDIE, W. *Phil. Mag.*, 35, *pp.* 209–210, *March*, 1944.—A correction. [Abstr. 149 (1943)].

535.8 : 535.7 *see Abstr.* 1592

535.81 1594

A new contact lens for viewing the angle of the anterior chamber of the eye. ALLEN, L. *Science*, 99, *p.* 186, *March* 3, 1944.

535.843.2 : 535.393 1595

The method of colour photomicrographs in the ultra-violet as applied to determination of silver in thin sections. BRUMBERG, E. M., AND SHEVCHENKO, M. V. *C.R.* (*Doklady*) *Acad. Sci. URSS*, 32, 7, *pp.* 486–488, 1941.—An earlier paper (25, 6, 1939) has described a new method of absorptional analysis of micro-preparations, based on obtaining colour photographs in transmitted ultra-violet light. The present paper describes a modification of this technique, using reflected light from opaque polished sections. As an example of its use, the reflecting method has been applied to the determination of micro-inclusions of metallic native silver in the mineral argentite. A. E. T.

536 : 547.412.62 1596

The heat capacity, heats of transition, fusion and vaporization, vapour pressure and entropy of 1,1,1-trifluoroethane. RUSSELL, H., JR., GOLDING, D. R. V., AND YOST, D. M. *J. Amer. Chem. Soc.*, 66, *pp.* 16–20, *Jan.*, 1944.—Data were measured in the range 13°–226°K. From the results, the calorimetric entropy is calculated. The Raman-spectrum data were reconsidered and slightly revised. From this and other molecular data, the entropy of the compound is calculated statistically. Comparison of the calculated and observed entropies indicates a barrier of (3 450 ± 400) /cal./mole hindering the internal rotation of the molecules.

536 : 547.412.632.2 1597

The heat capacity, heat of transition, vaporization, vapour pressure and entropy of 1,1,1-trichloroethane. RUBIN, T. R., LEVEDAHL, B. H., AND YOST, D. M. *J. Amer. Chem. Soc.*, 66, *pp.* 279–282, *Feb.*, 1944.—The heat capacity of 1,1,1-trichloroethane was measured from 14°K. to room temp. There is a transition point in the solid at 224·20°K. The heat of transition is (1 786 ± 2) cal./mole. An approx. value for the melting point is (240·2 ± 0·5)°K., and a rough value for the heat of fusion is (450 ± 300)

cal./mole. The heat of vaporization is (7 962 ± 12) cal./mole at 286·53°K. The entropy of the ideal gas at 286·53°K. and 1 atm. is (76·22 ± 0·16) cal./deg./mole, and (76·97 ± 0·16) cal./deg./mole at 298·16°K. and 1 atm. The entropy of the liquid at 298·16°K. is (54·37 ± 0·11) cal./deg./mole. A comparison of the statistical and calorimetric values of the entropy indicates a barrier of (2 700 ± 350) cal./mole.

536.413 : 679.5 1598

Thermal expansion properties of plastic materials. Clash, R. F., Jr., and Rynkiewicz, L. M. *Industr. Engng Chem.*, 36, *pp.* 279–282, *March*, 1944.—A simple dilatometer technique for determining the vol./temp. relations of plastics is described, and data are reported for a number of thermoplastic materials. Cubical expansion coefficients were calculated below and above the observed transition temperatures, and the effect of plasticizer addition on these properties is reported. Polyethylene shows expansion characteristics similar to those of paraffin wax but appreciably different from those observed for the other thermoplastics studied.

536.42 : 532.14 : 547.2 : 541.66 *see Abstr.* 1701

536.421.4 : 541.123.2.012.3 *see Abstr.* 1659

536.423.15 : 536.655 : 535.32 : 533.12 : 547.412.63 1599

The vapour pressure and heat of vaporization of trichloroethylene. McDonald, H. J. *J. Phys. Chem.*, 48, *pp.* 47–50, *Jan.*, 1944.—The v.p. of trichloroethylene was determined over the range 18°–86°C. and expressed in the form of an equation, and the heat of vaporization at the b.p. (87·19°C.) and 1 atm. pressure was found to be 7 679 cal./mole, with an estimated mean error of ± 100 cal. Equations are given for the variation of density and refr. index with temperature.

536.6.081 1600

The calory and the joule in thermodynamics and thermochemistry. Mueller, E. F., and Rossini, F. D. *Amer. J. Phys.*, 12, *pp.* 1–7, *Feb.*, 1944.—The present status of the calorie and joule in thermodynamics and thermochemistry is reviewed, particularly with regard to the actual calorimetric unit of energy, viz. the international joule. Two conventional calories are in use at present, the I.T. calorie used in steam tables which is defined as 4·1860 international joules, and the calorie of thermochemistry and chemical thermodynamics which is defined as = 4·1833 international joules (NBS). The authors suggest that conversion to calories be discontinued and the joule be more widely used. R. W. P.

536.63 1601

Specific heats at low temperatures of calcium sulphite, sodium sulphite and manganese dithionate dihydrate. Kelley, K. K., and Moore, G. E. *J. Amer. Chem. Soc.*, 66, *pp.* 293–295, *Feb.*, 1944.—Low-temp. sp. ht. measurements, throughout the range 51° to 298°K., were made. The respective entropies at 298·16°K. are 24·2 ± 0·3, 34·9 ± 0·4, and 66·7 ± 1·0.

536.631 : 546.261 1602

High-temperature heat content of calcium carbide. Moore, C. E. *Industr. Engng Chem.*, 35, *pp.* 1292–1294, *Dec.*, 1943.—Determinations of the heat content, above 25°C., of a sample of CaC_2 of 91·0% purity were made in the range 200° to 1 000°C. [see Abstr. 1810 (1942)]. Correction for the major impurities was applied. The data show a transition at 447° ± 5°C., with a heat effect of 1 330 cal./g. mol. wt.

536.633 1603

Heat capacities of hydrocarbon gases. Stull, D. R. *Industr. Engng Chem.*, 35, *pp.* 1303–1304, *Dec.*, 1943.—Addendum [Abstr. 2355 (1943)].

536.653 1604

Heats of dilution of sodium chloride in ethylene glycol at 25°. Wallace, W. E., Mason, L. S., and Robinson, A. L. *J. Amer. Chem. Soc.*, 66, *pp.* 362–365, *March*, 1944.—Equations for the rel. apparent molal heat content of the solute and for the rel. partial molal heat contents of the solute and solvent are derived.

536.655 : 535.32 : 533.12 : 547.412.63 : 536.423.15 *see Abstr.* 1599

536.658 1605

The accommodation coefficient of helium on platinum. Rolf, P. *Phys. Rev.*, 65, *pp.* 185–189, *March* 1 *and* 15, 1944.—The values of the coeff. at 77°, 193°, 273° and 373°K. are 0·090, 0·043, 0·071 and 0·072 (± 0·004), respectively. When the Pt is allowed to remain in contact with the He for 24 hr. or more, the values increase to 0·43, 0·071, 0·170 and 0·170. Little adsorption occurs at 193°K., but strong van der Waals adsorption appears at 77°K. and activated adsorption at the higher temperatures.

536.658 : 532.62 *see Abstr.* 1554

536.658 : 532.62 : 532.614 *see Abstr.* 1552

536.658 : 536.71 : 532.62 1606

Condensation and supersaturation of adsorbed phases. Cassel, H. M. *J. Chem. Phys.*, 12, *pp.* 115–116, *March*, 1944.

536.658 : 547.458.6 : 541.183.2 *see Abstr.* 1694

536.658 : 661.713 : 539.388.8 *see Abstr.* 1651

536.662 : 662.61 1607

The heat content of the products of combustion. Luly, E. L. *Inst. Fuel War Time Bull.*, *pp.* 98–103, *Feb.*, *and pp.* 137–139, *April*, 1944.—When a complete analysis of the coal is not available, the Siegert formula may be employed to calculate the % loss of heat in flue gas, which $= k(T - t)/(CO_2)$, where T = temp. of exit gases in °F., t = air temp., CO_2 = % CO_2 in exit gases at point where T is measured, k = const., which for a bituminous coal = 0·35. When the analysis of the fuel is available, the weight of air required to produce the stated % of CO_2 can be calculated, and then using the appropriate values of the sp. heats, and making allowance for dissociation, the heat content of the gases may be determined precisely. This has been done and diagrams are given connecting the various factors in the fundamental equations with the gas temp. Heat rejection by the moisture in the flue gases is included in the analysis. A. C. W.

536.666 : 678.7 1608

Heats of vulcanization of synthetic rubbers. Bruce, P. L., Lyle, R., and Blake, J. T. *Industr. Engng Chem.*, 36, *pp.* 37–39, *Jan.*, 1944.—The shape of the curve relating heat evolved to the amount of S present

is similar for natural rubber, Buna S, and Buna N, Amounts of heat evolved are of the same order of magnitude. The addition of carbon black to the Buna S compound lowers the apparent heat evolved in the region above 4% S. Butyl rubber is vulcanized by S with only a slight evolution of heat. *p*-Quinone dioxime vulcanization evolves considerable heat which is produced partially by the vulcanization of the Butyl rubber and partially by a side reaction.

536.7 1609

The principles of thermodynamics. LEAF, B. *J. Chem. Phys.*, 12, *pp.* 89–98, *March*, 1944.—A formulation of thermodynamics is developed which points out the restrictions of classical treatments. This formulation in terms of potential and charge concepts predicts the property of increasing entropy during thermodynamic processes and leads to an equation for entropy produced and heat dissipated in irreversible processes. The postulates of the treatment presented allow deduction of a generalized form of the second law of thermodynamics which applies to each energy field of the system. These concepts are further developed in discussion of the phase rule; the functions *H*, *A*, and *F*; a generalization of Kelvin's postulate; and a generalization of the Carnot cycle. The results permit derivation of the principles of Brønsted's system of energetics.

536.7 : 532.739.2 : 541.134 *see Abstr.* 1684

536.7 : 541.64 : 532.77 *see Abstr.* 1562

536.71 : 532.62 : 536.658 *see Abstr.* 1606

536.71 : 547.21 : 541.123.2 *see Abstr.* 1658

536.71 : 547.214 : 541.122 *see Abstr.* 1655

537.122 : 535.23 1610

Finite self-energies in the radiation theory. III. LANDÉ, A., AND THOMAS, L. H. *Phys. Rev.*, 65, *pp.* 175–184, *March 1 and* 15, 1944.—The field theory [Abstr. 132 (1942)] is interpreted as Maxwell's theory with a linear differential relation between the fields *E*, *B* and *D*, *H* involving a new const. *k* which measures the reciprocal radius of the electron. The mesonic field of min. frequency $\nu_0 = kc/2\pi$ represents polarization of the vacuum. The electron is a singularity in the *D*, *H* field whereas *E*, *B* remain finite. The electron moves under the condition that the Lorentz force vanishes identically on the singularity, so that no work is done on the particle. All energy is located in the field. Electromagnetic and inert mass are identical. The field theory works with retarded potentials only, and self-acceleration is avoided. Stable equilibrium between electrons and radiation is granted by spontaneous and induced transitions. The electron has no magnetic self-energy, its radius is the ordinary electrostatic radius $1/k = e^2/2mc^2$.

537.226.2 : 621.317.361 : 546.267 1611

Studies on hydrogen cyanide. XIII. The dielectric constant of anhydrous hydrogen cyanide. COATES, G. E., AND COATES, J. E. *J. Chem. Soc.*, *pp.* 77–81, *Feb.*, 1944.—The permittivity of anhydrous liquid HCN was measured, together with its variation with temperature. Both the permittivity and the temp. coeff. are abnormally high, and are interpreted in terms of the formation of transitory linear polymers of high dipole moment whose mean length is shortened by thermal agitation with increasing temperature.

537.226.2.08 1612

On the measurement of dielectric constant in the centimetre band. SOOS, A. N. *C.R. (Doklady) Acad. Sci. URSS*, 33, 3, *pp.* 210–212, 1941.—The free-wave method proposed by Velasco and Hutchinson [Abstr. 3415 (1939)] was used to measure the permittivity at wavelength 5 cm. of methyl-methacrylate, styrol, sulphur, rock-salt and mica; and also of a series of semi-conductors. In addition, the method was extended to apply also to double layers, this enabling liquid dielectrics to be tested by this method. Results are given for CCl_4, methyl alcohol and ethyl alcohol, for the same wavelength. A. E. T.

537.228.1 : 553.621 : 548.0 *see Abstr.* 1707

537.311 : 661.713 : 537.36 *see Abstr.* 1615

537.311.5 : 621.3.014.1 1613

Notes on the flow of current between electrodes on the surface of a metal plate or tube. THORNTON, W. M. *J. Instn Elect. Engrs*, 91, *Part II*, *pp.* 65–76, *April*, 1944.—[Abstr. 1303 B (1944)].

537.36 : 532.133 : 541.182 1614

Electrokinetics. XXVI. The electroviscous effect. III. In β-lactoglobulin systems. Interpretation of the meaning of $K\phi$ values obtained from electroviscosity data. BRIGGS, D. R., AND HANIG, M. *J. Phys. Chem.*, 48, *pp.* 1–12, *Jan.*, 1944.—The Krasny–Ergen equation is modified in the light of experimental results for aq. systems of gum arabic or casein, and measurements for β-lactoglobulin-NaCl and Na-gum-arabate-NaCl are applied to the modified equation. Results for the two systems are compared and a theory to explain the differences between them as representative of two distinct classes of colloids is proposed; β-lactoglobulin is pictured as an internally strong micelle and Na gum arabate as an internally weak one. N. M. B.

537.36 : 537.311 : 661.713 1615

Electrokinetic properties and surface conductivity of cellulose and oxycellulose, with reference to the carboxyl group content. RABINOV, G., AND HEYMANN, E. *J. Phys. Chem.*, 47, *pp.* 655–668, *Dec.*, 1943.—Experimental conditions and theoretical considerations affecting the streaming-potential method are discussed. In distilled water, the ζ-potential decreases and surface conductivity increases with increasing carboxyl-group content. Substitution of carboxyl hydrogen by C and Na lowers surface conductivity, but affects the ζ-potential little. The max. in the ζ/C curve for alkali chlorides is not due to a dispersion of surface conductivity. For uni-univalent and bi-univalent electrolytes, the surface conductivity shows increase with conc.

537.36 : 577.15.037 1616

An electrophoretic study of mixtures of ovalbumin and yeast nucleic acid. LONGSWORTH, L. G., AND MACINNES, D. A. *J. Gen. Physiol.*, 25, *pp.* 507–516, *March*, 1942.—Electrophoretic patterns of mixtures of ovalbumin and yeast nucleic acid indicate that the constituents migrate independently in buffer solutions of 0·1 ion in strength and at *p*H values somewhat higher than the iso-electric point of the protein. Equations are developed with the aid of which an electrophoretic analysis of the mixture is possible. C. J. G.

537.523.5 : 621.3.064.2 1617

Diffusion phenomena in alternating-current arcs. O'Doherty, J. J. *Nature, Lond.*, 153, *pp.* 558–559, *May* 6, 1944.—[Abstr. 1308 B (1944)].

537.525 1618

Investigation of transient processes in a low-pressure mercury discharge. Granovsky, V. L., and Okhlopkov, V. A. *C.R.* (*Doklady*) *Acad. Sci. URSS*, 32, 7, *pp.* 489–491, 1941.—Describes probe measurements in a Hg vapour discharge subjected to a perturbation corresponding to the transition from one ion concentration to another. The perturbation was effected by switching-on a thyraton, which could shunt either the discharge tube (− perturbation) or the additional resistance in the anode circuit of the tube (+ perturbation). Oscillograms of the ion probe current are reproduced. A. E. T.

537.525.8 : 535.215 *see Abstr.* 1571

537.531 : 535.338 1619

Continuous X-ray spectrum: note to experimenters. Weinstock, R. *Phys. Rev.*, 65, *p.* 150, *Feb.* 1 *and* 15, 1944.

537.531 : 535.338.3 1620

Auger transitions and widths of X-ray energy levels. Cooper, J. N. *Phys. Rev.*, 65, *pp.* 155–161, *March* 1 *and* 15, 1944.—Atomic-number ranges wherein large variations might be expected were studied. Part of the width variation for $L\beta_3$ for elements $73 \leqslant Z \leqslant 92$ is attributed to the Auger transitions $M_{III} \rightarrow M_V N_{IV,V}$. The transitions $N_{II} \rightarrow N_{III} O_{II,III}$, $N_{II} \rightarrow N_{IV,V} N_{IV,V}$, and $N_{III} \rightarrow N_{IV,V} N_{IV,V}$ are shown to explain an intensity anomaly of M_ζ^ζ for elements $38 \leqslant Z \leqslant 58$. Several other irregular line width variations are correlated with changes in the probabilities of Auger transitions. Auger transitions are primarily responsible for anomalous changes in line width.

537.531 : 535.43 1621

On diffuse scattering of X-rays. Brekhovskikh, L. M. *C.R.* (*Doklady*) *Acad. Sci. URSS*, 32, 7, *pp.* 478–480, 1941.—Various authors have reported on the existence of complementary max., along with the ordinary Laue-max. in X-ray photographs. Two different theories have been advanced to account for these complementary max. and to predict their location. This paper explains the equivalence of these theories in the prediction of location, but shows that this equivalence ceases when they are applied to the calculation of the width of the complementary max. A. E. T.

537.531.8 : 620.179.152 1622

Improving X-ray radiographs. Taylor, R. *Met. Progr.*, *pp.* 270–272, *Feb.*, 1944.—[Abstr. 1289 B (1944)].

537.533.72 : 539.133 *see Abstr.* 1634

537.533.72 : 547.458.81 : 539.216.1 = 3 *see Abstr.* 1637

537.533.79 : 621.319.4 : 621.3.017.143 1623

Power loss in deflecting condensers. Gabor, D. *Wireless Engr*, 21, *pp.* 115–116, *March, and Corresp., pp.* 207–209, *May*, 1944.—[Abstr. 1305 B (1944)].

537.533.79 : 621.319.4 : 621.3.017.143 1624

Transversely deflected electron beams. Harries, O. *Wireless Engr*, 21, *pp.* 176–177, *April, and Corresp., pp.* 207–209, *May*, 1944.—[Abstr. 1306 B (1944)].

537.533.9 : 547.458.81 : 539.216.1 = 3 *see Abstr.* 1640

537.533.92 1625

The ionization cross-section of the silver L_{III} state. McCue, J. J. G. *Phys. Rev.*, 65, *pp.* 168–175, *March* 1 *and* 15, 1944.—The ionization cross-section was measured by observing the intensity of the $L\alpha$ doublet radiation from a thin target of Ag bombarded by cathode rays whose energies ranged up to 9 × the excitation energy of the L_{III} state. The data are corrected for diffusion, rediffusion, and retardation of the cathode rays. The measured values of the cross-section agree with calculations based on the Born approximation, but the agreement is not within experimental error.

537.591.1 1626

The method of shower anticoincidences for measuring the meson component of cosmic radiation. Sarabhai, V. *Phys. Rev.*, 65, *pp.* 203–204, *March* 1 *and* 15, 1944.

537.591.15 1627

On the spin of the meson. Chakrabarty, S. K., and Majumdar, R. C. *Phys. Rev.*, 65, *p.* 206, *March* 1 *and* 15, 1944.

537.591.3 : 539.16.08 1628

A new cosmic-ray recorder and the air-absorption and decay of particles. Duperier, A. *Terr. Magn. Atmos. Elect.*, 49, *pp.* 1–7, *March*, 1944.—A photographic recorder registering cosmic-ray 3-fold coincidences without screen is described. The analysis of the first data obtained shows that the partial correlation of the daily means with the heights corresp. to a pressure level in the atmosphere is greater the higher the selected pressure level from the ground, up to 16 km. Supposing that the mesons are generated at the layer of 75 mm. Hg, the true absorption coeff. and the mean rate of decay can be calculated. For the absorption coeff., $\mu = 1{\cdot}68 \times 10^{-3}$ cm.²/g., and for the rate of decay, $\mu' = 0{\cdot}054$ per km. From the value of μ' it results that for the mean range of the meson before disintegrating spontaneously, $L = 18{\cdot}6$ km., and for the mean life of a meson of 3×10^9 eV energy, when at rest, $\tau_0 = 1{\cdot}6 \times 10^{-6}$ sec. The temp. coeff. = − 0·35% per °C.

537.591.8 : 539.17 1629

Anomalous rate of nuclear disintegration effected by cosmic rays. Zhdanov, A. P., Perfilov, N. A., and Deisenrod, M. Y. *Phys. Rev.*, 65, *pp.* 202–203, *March* 1 *and* 15, 1944.

538.12 : 621.318.3 1630

A new method for the theoretical investigation of magnetic field of electromagnets. Sotchnev, A. J. *C.R.* (*Doklady*) *Acad. Sci. URSS*, 33, 1, *pp.* 24–27, 1941.—After discussing existing methods of calculation, a new method is proposed, and examples of its application are illustrated: multi-polar electromagnets as used in separators; gaps between two pole tips, one of which is rifled and the other smooth or with hollows under the rifles; gap between plane and wedge-shaped pole tips of double polar electromagnets. A. E. T.

538.24 : 621.3.018.3 = 4 1631

A relation between the third harmonic of an alternating current and the magnetization curve. Rossier, C. *Arch. Sci. Phys. Nat.*, 24, *Nov.–Dec.* (*Suppl. No.* 3, *C.R. Soc. Phys. Hist. Nat., Genève*, 59, *pp.* 208–210), 1942.—[Abstr. 1307 B (1944)].

538.32 : 530.15 1632

Problem of two electrons and Newton's third law. HOWE, G. W. O. *Wireless Engr*, 21, *pp.* 105–107, *March*, 1944.—If an electron, *A*, is moving at right angles to another, *B*, on its line of motion, *A* experiences a force which should give rise to a reaction at *B*. This, however, according to the conditions of the problem, is impossible, and it would appear that Newton's third law is violated. The problem is attacked by considering a parallel case in which coils are used in place of the electrons, and the conclusion is reached that the reaction is exerted on the displacement currents. It is difficult, however, to find a mechanical support for the reaction. A. J. M.

539.13 : 547.962.3 : 541.183.022 : 535.417 = 3
see Abstr. 1588

539.133 1633

The dipole moments of friedelin, cerin, isomers of friedelinol and isomers of 3-α-naphthyl-1-chloro-1-propene. LANDER, J. J., AND SVIRBELY, W. J. *J. Amer. Chem. Soc.*, 66, *pp.* 235–239, *Feb.*, 1944.—The precision of calculated P_2 values and consequently of the d.m. of a solute in a given solvent does not depend on the abs. values of permittivity and density. Marked upswings and downswings in the polarization curves at high dilution are due to experimental error in measuring ε_0. It is suggested that an extrapolated ε_0 value obtained from an $\varepsilon\ v\ .\ N_2$ plot be accepted as the permittivity of the pure solvent. The d.m. of friedelin, low- and high-melting friedelinol, cerin and the solid and liquid forms of 3-α-naphthyl-1-chloro-1-propene were determined.

539.133 : 537.533.72 1634

The molecular structures of dimethyl silicon dichloride, methyl silicon trichloride and trifluoro silicon chloride. LIVINGSTON, R. L., AND BROCKWAY, L. O. *J. Amer. Chem. Soc.*, 66, *pp.* 94–98, *Jan.*, 1944.—Electron-diffraction measurements were made on the vapours of dimethyl silicon dichloride, methyl silicon trichloride and trifluoro silicon chloride. The observed Si-C distance is shorter than in $Si(CH_3)_4$, while the Si-Cl distances are not much different from the values observed in other silicon chlorides. The SiF_3 group in SiF_3Cl does not bind the Cl more tightly than in $SiCl_4$, in contrast to the effect observed in CF_3Cl compared with CCl_4.

539.16.08 : 537.591.3 *see Abstr.* 1628

539.16.08 : 546.49 1635

Mercury-vapour measurement: a radioactive method. GOODMAN, C., IRVINE, J. W., AND HORAN, C. F. *J. Industr. Hyg. Toxicol.*, 25, *pp.* 275–281, *Sept.*, 1943.—This paper describes the application of radioactive mercury as a tracer in the measurement of the concentration of mercury vapour in air. A greater sensitivity than that of previous analytical methods is indicated. C. J. G.

539 163.4 : 546.294 : 621.384.6 1636

Cyclotron targets: preparation and radiochemical separation. II. Krypton. BROWN, S. C., IRVINE, J. W., JR., AND LIVINGSTON, M. S. *J. Chem. Phys.*, 12, *pp.* 132–134, *April*, 1944.—[Abstr. 1436 B (1944)].

539.17 : 537.591.8 *see Abstr.* 1629

539.211 : 548.0 : 535.417 *see Abstr.* 1587

539.216.1 : 537.533.72 : 547.458.81 = 3 1637

Remark on the discussion on electron microscopy of cellulose fibres. FREY-WYSSLING, A. *Kolloid Z.*, 100, *pp.* 304–305, *Aug.*, 1942.—Critical remarks [Abstr. 2659 (1942)]. R. N.

539.216.1 : 539.382.2 = 3 1638

The elongation of the amorphous ranges with affine deformation of a micellar network. BAULE, B., AND KRATKY, O. *Z. Phys. Chem. B.*, 52, *pp.* 142–152, *Sept.*, 1942.—For the micellar network previously described [Abstr. 1621 (1942)] the deformations are calculated which the intermediate amorphous ranges must undergo when cellulose hydrate fibres are stretched. R. N.

539.216.1 : 541.124 : 547.458.81 : 539.26 = 3
see Abstr. 1647

539.216.1 : 541.68 : 677.31 1639

Contributions to the structure and chemistry of the wool fibre. ELÖD, E., NOVOTNY, H. AND ZAHN H. *Kolloid Z.*, 100, *pp.* 283–298, *Aug.*, 1942.—[See Abstr. 1508 (1943)]. Supermicroscopic and systematic analytical investigations were made in order to find the connection between structural and mechanical properties of the wool fibre and kind and number of chemical bonds in the albumen molecule. The influence of peptide bonds is shown to be greater than that of cystine bonds. R. N.

539.216.1 : 547.458.81 : 537.533.9 = 3 1640

The behaviour of cellulose fibres in the electron microscope. HAMANN, A. *Kolloid Z.*, 100, *pp.* 248–254, *Aug.*, 1942.—That blister structures [Abstr. 1354 (1942)] are secondary phenomena due to the action of the electron beams is shown by electron microscopy of very thin fibres of hydrated cellulose taken from both the bark layer and the marrow part and prepared by a new method. The blister shape is not the final stage. With continued irradiation, the fibre structure is totally destroyed. The changes which the fibre undergoes are explained as a chemical reaction leading to levoglucosane. R. N.

539.217 : 676 1641

Penetration of papers by water vapour. I. *Paper Tr. J.*, 116, *pp.* 11–15, *April* 8, *and pp.* 10–13, *June* 10, 1943.—The present status of the measurement of water-vapour permeability is discussed, and the usual gravimetric method is carefully considered and found to be subject to large errors. A new method, in which the permeability of the test specimen is compared with that of a standard of diffusion resistance, is described and illustrated. Evaluation of the R.H. of air confined in a small space may be effected by one of several methods, some of which are briefly discussed. None of them requires a very large sorption of moisture or involves an appreciable change of temperature. C. J. G.

539.217.5.08 1642

Apparatus for measuring the gas permeability of film materials of low permeability. SHUMAN, A. C. *Industr. Engng Chem.* (*Analyt. Edit.*), 16, *pp.* 58–60, *Jan.* 15, 1944.—A simple, easily operated, and highly sensitive apparatus is described for measurements at permeabilities as low as 0·001 cm.³/in.²/24 hr. The method involves measuring, inside a small evacuated space, changes of pressure due to a gas passing into the space through the film tested. It is suitable for

investigations of food and drug wrappings where low permeability to particular gases is required. N. M. B.

539.23 : 539.26 : 621.357.7 1643

Bonding and structural variations of commercial electroplatings 2-55 × 10^{-6} in. thick. CLARK, G. L., PISH, G., AND WEEG, L. E. *J. Appl. Phys.*, 15, *pp.* 193–200, *Feb.*, 1944.—[Abstr. 1410 B (1944)].

539.232 : 621.385.833 = 3 1644

On thermically produced oxide films with aluminium. MAHL, H. *Kolloid Z.*, 100, *pp.* 219–228, *Aug.*, 1942.—[Abstr. 1438 B (1944)].

539.234 : 548.74 = 3 1645

Production of temperature-resisting carrier foils for the determination of lattice constants of systems of several metallic substances by electron interferences. BOETTCHER, A. *Kolloid Z.*, 100, *pp.* 228–230, *Aug.*, 1942.—The oxide of Al vaporized in high vacuum on to heated fissure surfaces of rocksalt was used as a carrier foil for giving a suitable scale for determining the lattice constants of metallic systems consisting of several components, e.g. AlAg in various phases. Contrary to the amorphous foils previously produced [Abstr. 1359 (1942)] these foils show a definite interference picture. R. N.

539.234 : 548.74 = 3 1646

Investigations on the structure of metal layers, vaporized upon a carrier, by supermicroscope and electron diffraction. HASS, G. *Kolloid Z.*, 100, *pp.* 230–242, *Aug.*, 1942.—[See Abstr. 1359 (1942)]. Thin metal films of Ag, Al and Sb, vaporized in different thicknesses on to carriers like rocksalt, alumina or collodion, were investigated with a supermicroscope allowing also of taking electron diffraction pictures. The results obtained concerning the fine structure of the layers throw light on anomalies in their conductivity. An accurate determination of the lattice constants of Al and Ag was carried out. R. N.

539.26 : 539.216.1 : 541.124 : 547.458.81 = 3 1647

The reaction metal-hydroxide-solution–cellulose fibre. IV. X-ray examination of the lattice transformations of fibrous hydrated cellulose regenerated from solutions of natural cellulose. SCHRAMEK, W., AND SUCCOLOWSKY, O. *Kolloid Z.*, 100, *pp.* 299–303, *Aug.*, 1942.—The reactions of regenerated Na cellulose fibres belong to the heterogeneous type. The observation of exact reaction boundaries is difficult owing to the nature of the fibre. The course of reaction is investigated for 2 different ranges of the conc. of caustic soda, 0–18% and above 18%. The reversibility of the lattice transformation is discussed. R. N.

539.26 : 621.357.7 : 539.23 *see Abstr.* 1643

539.26 : 669 1648

Microradiography—a new metallurgical tool. MADDIGAN, S. E., AND ZIMMERMAN, B. R. *Metal Technol.*, *pp.* 9–26, *Feb.*, 1944.—Microradiographic technique is described and the laws of X-ray absorption are discussed. The use of characteristic radiations of intermediate wavelength is explained and examples indicate that the microradiographic method can serve as a powerful auxiliary to the metallographic microscope. Cases are mentioned in which the radiograph has revealed that the true shape of inclusions was different from that indicated by photomicrographs, notable examples being Pb in cold-worked brass and Te in a cold-worked Cu-Te alloy. M.-V.

539.3 : 591.473 1649

On monodisperse myosin solutions. SCHRAMM, G., AND WEBER, H. H. *Kolloid Z.*, 100, *pp.* 242–247, *Aug.*, 1942.—The components of muscle extracts were analysed by the ultra-centrifuge and optically investigated in order to determine the structural principles of muscle fibres and to explain their high elasticity and contractibility. R. N.

539.37 : 678/679 1650

Resinoids and other plastics as film formers. XXII. High-elastic deformation of polymers. BRAJNIKOFF, B. J. *Plastics*, 7, *pp.* 572–578, *Dec.*, 1943, *and* 8, *pp.* 44–50, *Jan.*, 1944.—This section deals with deformation under the action of periodic forces. The theory is discussed, and a number of curves give the results of measurements of deformation as a function of temperature, at various frequencies of oscillation. Materials tested were natural rubber, chloroprene, vulcanized ebonite and methyl methacrylate. E. R. A.

539.382.2 : 539.216.1 = 3 *see Abstr.* 1638

539.384 : 548.73 *see Abstr.* 1711

539.388.8 : 536.658 : 661.713 1651

A new interpretation of the cellulose-water adsorption isotherm and data concerning the effect of swelling and drying on the colloidal surface of cellulose. ASSAF, A. G., HAAS, R. H., AND PURVES, C. B. *J. Amer. Chem. Soc.*, 66, *pp.* 66–73, *Jan.*, 1944.—A study of the moisture adsorption isotherms of highly swollen cotton linters after treatment [Abstr. 1653 (1944)] indicates that the avid adsorption of water up to the first inflection is mainly a function of the strong H-bonding capacity of the accessible primary alcoholic groups. The flat intermediate portion of the isotherm represents the water less strongly H-bonded to the secondary alcoholic groups, but its shape is influenced at the higher humidities by the effects of swelling and by capillary condensation. Some physico-chemical implications of these ideas are discussed. Some data given throw fresh light on the significance of the mercerization or reactivity ratio of cellulose. N. M. B.

539.388.8 : 552.524 : 624.131 1652

Rôle of electrolytes in the deformation of loess-like loams upon moistening. DENISOV, N. J. *C.R. (Doklady) Acad. Sci. URSS*, 33, 2, *pp.* 122–124, 1941.—The contraction of these soils consequent upon an increase of moisture content is a factor which may be of importance in building practice. The author has carried out experiments to study the effect of solutions of electrolytes on this contraction. The results have shown that solutions of electrolytes produce less contraction of the dry soil than water itself; but that introduction of these solutions after a contraction produced by water causes an additional contraction. Explanation of these effects is sought in terms of the friction between particles, which in turn depends on the concentration of the soil solution. A. E. T.

539.388.8 : 661.713 1653

A study of the amorphous portion of dry, swollen cellulose by an improved thallous ethylate method. ASSAF, A. G., HAAS, R. H., AND PURVES, C. B.

J. Amer. Chem. Soc., 66, *pp.* 59–65, *Jan.*, 1944.—Cotton linters, highly swollen in NaOH and dried through methanol and C_6H_6, were immersed in a large excess of 0·1 *N* TlOEt solution, and a method is described of finding the % of the cellulose wetted by the particular liquid in which the TlOEt was dissolved. The effects of different types of solvent are reported and discussed. N. M. B.

539.4.019 : 678 : 541.127.1 *see Abstr.* 1671

539.501 : 532.13 *see Abstr.* 1543

539.501 : 679.5 1654

Plastics: structure and physical properties. TURNER, L. W. *Chem. and Ind.*, 62, *pp.* 492–495, 1943. *Abstr. in J. Text. Inst., Manchr*, 35, *p. A*114, *March*, 1944.—The fundamental deformation processes are summarized in the form of an equation giving, for a const. temperature, the rel. between (*a*) deformation and time, and (*b*) deformation and stress. Since the state of different plastic materials is different at the same temperature, and since temperature itself has a marked influence on the behaviour, the method chosen to determine the relationships (*a*) and (*b*) will depend on the state of the material at the temperature of test. The method consists of applying, at different temperatures, a stress (whether tensile, compressive or shearing), and measuring the resulting deformation as a function of time. E. R. A.

541.122 : 536.71 : 547.21 1655

Phase equilibria in hydrocarbon systems. OLDS, R. H., REAMER, H. H., SAGE, B. H., AND LACEY, W. N. *Industr. Engng Chem.*, 36, *pp.* 282–284, *March*, 1944.

541.123.2 1656

Equilibrium still for partially miscible liquids. Data on isobutanol-water. COLBURN, A. P., SCHOENBORN, E. M., AND SHILLING, D. *Industr. Engng Chem.*, 35, *pp.* 1250–1254, *Dec.*, 1943.—A vapour mixture is generated from separate boilers containing the pure components, and this vapour is bubbled through liquid in an adiabatic trap until the latter reaches equilibrium. Data were obtained on ethylene-dichloride–toluene and on isobutanol–water. The former conformed with Raoult's law and with earlier data; the latter agreed with those of Stockhardt and Hull, and showed general consistency when plotted as activity coefficients.

541.123.2 : 518.4 1657

Chart for distillation of binary mixtures. FAASSEN, J. W. *Industr. Engng Chem.*, 36, *pp.* 248–252, *March*, 1944.

541.123.2 : 536.71 : 547.21 1658

Phase equilibria in hydrocarbon systems. REAMER, H. H., OLDS, R. H., SAGE, B. H., AND LACEY, W. N. *Industr. Engng Chem.*, 36, *pp.* 88–90, *Jan.*, 1944.—The volumetric behaviour of 4 mixtures of CH_4 and CO_2 was studied at 100°–460°F. and from 100 to 10 000 lb./in.^{2} The volumetric behaviour of CO_2 was investigated as a check upon the purity of the sample and the methods of measurement.

541.123.2.012.3 : 536.421.4 1659

The solid-liquid phase equilibria of the system *p*-toluidine–acetic-acid. LUCASSE, W. W., KOOB, R. P., AND MILLER, J. G. *J. Phys. Chem.*, 48, *pp.* 85–89, *March*, 1944.—The existence of the compound $p\text{-}CH_3C_6H_4NH_2 . 2CH_3COOH$ has been confirmed by determination of the m.p. curve of the 2-component system. The m.p. of the compound is 49·1°C., and those of the eutectics at 30·2 and 89·7 mole % acetic acid are 28·6° and 6·4°C., respectively.

541.123.28 1660

High-pressure absorption of low-boiling hydrocarbons. KIRKBRIDE, C. G., AND BERTETTI, J. W. *Industr. Engng Chem.*, 35, *pp.* 1242–1249, *Dec.*, 1943.—At l.p. a paraffinic-type lean oil is preferred to an aromatic or naphthenic type because substantially less volume is required for the same amount of pentane absorption. The amount of methane absorption for the same pentane recovery is essentially the same for each of the 3 types of lean oils. At h.p. the aromatic- and naphthenic-type lean oils have a substantial selectivity of pentane absorption with resp. to methane, compared with that obtained with paraffinic-type lean oil of the same boiling range. The lean-oil loss with aromatic type is < that for paraffinic type. The volume of lean oil required in the case of aromatic type is >, and in the case of naphthenic type about the same as, that required with paraffinic-type lean oil.

541.123.3 : 669.018 1661

Diagram "composition-thermostability" of the ternary solid solution of iron-chromium-aluminium alloys. KORNILOV, I., AND MINZ, R. *C.R. (Doklady) Acad. Sci. URSS*, 34, 3, *pp.* 78–82, 1942.—Thermostability is measured as the loss in wt. by oxidation at 1 200°C. per unit surface area of the exposed sample. On the basis of the results, the diagram of these alloys is established, in which curves of const. rate of loss in wt., or its reciprocal, are plotted on the conc. triangle of the system Fe-Cr-Al. The significance of the diagram in the selection of alloys is indicated. A. E. T.

541.123.31 1662

The ternary systems barium-chloride–dioxane–water and calcium-chloride–dioxane–water. BOGARDUS, H. F., AND LYNCH, C. C. *J. Phys. Chem.*, 47, *pp.* 650–654, *Dec.*, 1943.—The 25°C. isotherms for the systems $BaCl_2$–dioxane–water and $CaCl_2$–dioxane–water are presented. A new solvate, $CaCl_2 (C_2H_4)_2O_2 . 2H_2O$), was separated and identified.

541.123.4 : 532.14 : 535.324 1663

The ternary system: dioxane–benzene–water. BERNDT, R. J., AND LYNCH, C. C. *J. Amer. Chem. Soc.*, 66, *pp.* 282–284, *Feb.*, 1944.—The 25° isotherm of the dioxane–benzene–water system is presented. Refr. index and density data at 25° for the dioxane–benzene and the ternary system dioxane–benzene–water are given, as well as an analysis diagram for the miscible region of the ternary system.

541.123.54 : 541.135.5 *see Abstr.* 1687

541.123.6 : 518.4 1664

Tie lines in quaternary liquid systems. SMITH, J. C. *Industr. Engng Chem.*, 36, *pp.* 68–71, *Jan.*, 1944.—A method of representing equilibria in quaternary liquid systems by means of plane graphs is described.

541.124 1665

Interpretation of some reactions in the carbohydrate field in terms of consecutive electron displacement. ISBELL, H. S. *J. Res. Nat. Bur. Stand., Wash.*,

32, *pp.* 45–60, *Feb.*, 1944.—The peculiar properties of systems involving double bonds may be explained by the migration of electron pairs in the molecule from points of high electron density to points of lower electron density, with the addition and elimination of ions. A number of apparently unrelated complex reactions of the carbohydrates are considered, and it is shown that the formation of the products may be explained by a few simple reactions involving shifts of electron pairs; these include enolizations, de-enolization and double decomposition.

541.124 : 547.458.81 : 539.216.1 : 539.26 = 3
see Abstr. 1647

541.124 : 678 : 541.57 1666

Sulphur linkage in vulcanized rubbers. Reaction of methyl iodide with sulphur compounds. Reaction of methyl iodide with vulcanizates. SELKER, M. L., AND KEMP, A. R. *Industr. Engng Chem.*, 36, *pp.* 16–28, *Jan.*, 1944.—The wide difference in the reaction rates of CH_3I with simple S compounds was studied for use in investigating S linkages in vulcanized rubber. The reactions are: at room temp. CH_3I reacts slowly with mercaptans to give HI; with disulphides very slowly, the S-S link being ruptured with liberation of free I; and with sulphides in 1–3 days, the product depending on the type of residue on the S atom. HgI catalyses the sulphide and disulphide reactions. Pale crepe rubber or GR-S does not interfere chemically with the reactions. Details of the application of the reactions to various natural and synthetic rubbers are tabulated and plotted. The dispersion of vulcanized rubber in solvents which do not attack the S bonds depends on the presence of O_2. The reaction of CH_3I with vulcanizates at 24° leads to the removal of part of the combined S as trimethyl sulphonium iodide. Evidence is presented that the S so removed is sulphide S linked to the α-methylene C atom of the rubber polyisoprene chain. Upon over-cure, non-removable S is converted to removable S; the S which combines upon over-cure is completely removable. Complete desulphurization can be achieved with CH_3I at 100°.

N. M. B.

541.127 : 541.128.1 : 678.7 1667

Stability of butadiene. ROBEY, R. F., WIESE, H. K., AND MORRELL, C. E. *Industr. Engng Chem.*, 36, *pp.* 3–7, *Jan.*, 1944.—Reactions which butadiene undergoes during storage and plant processing are studied, esp. dimerization by a Diels–Alder type condensation, and polymerization to plastic materials of high mol. wt. The first reaction is bimolecular and homogeneous in the liquid phase under a variety of conditions. Bimolecular-reaction rate constants were determined for a range of temperatures and compared with the constants for the gas phase reaction. The formation of higher-mol. wt. polymers is peroxide-catalysed. For a number of peroxide catalysts the rate of polymerization to plastic substances is $\propto \sqrt{}$ (peroxide conc.). Data on the rate of peroxidation of butadiene are given.

541.127.1 1668

Kinetics of reactions between iodine and histidine. LI CHOH HAO. *J. Amer. Chem. Soc.*, 66, *pp.* 225–227, *Feb.*, 1944.—The reaction between iodine and histidine to form diiodo-histidine is evident from the kinetic data; the kinetics of its formation is similar to that found in diiodo-tyrosine formation. At 25° in citrate buffer the rate of diiodo-histidine formation follows the expression: rate $= 2{\cdot}5$ (histidine) $(I_2) + 1{\cdot}2 \times 10^5$ (histidine) (HOI).

541.127.1 1669

The kinetics of the antioxygenic synergism of quinones with ascorbic acid in fat systems. CALKINS, V. P., AND MATTILL, H. A. *J. Amer. Chem. Soc.*, 66, *pp.* 239–242, *Feb.*, 1944.—The abs. reaction rate of oxidation of ascorbic acid in ethyl esters of lard fatty acids was measured in the presence and absence of quinone. The synergism of quinone with ascorbic acid in the stabilization of these esters is due to the catalytic action of quinone. Quinone acts as a catalyst by being reduced to a semiquinone, which latter regenerates quinone by being oxidized by the activated peroxide radicals; this reduction of the peroxide radical prevents accumulation of peroxides and protects the substrate. Quinone serves as an intermediary agent in the ascorbic-acid–ester system by lowering the free energy of formation of the activated complex to such an extent that it doubles the number of particles of ascorbic acid possessing sufficient energy of reaction.

541.127.1 1670

Kinetics of transformation of 2-ketopolyhydroxy acids. REGNA, P. P., AND CALDWELL, B. P. *J. Amer. Chem. Soc.*, 66, *pp.* 246–250, *Feb.*, 1944.—The kinetics of the consecutive reactions of five 2-keto-polyhydroxy acids and the decomposition of their ascorbic-acid analogues were studied at 59·9° and 69·9° in 5 *M* HCl. The rates of rearrangement of 2-ketopolyhydroxy acids into their ascorbic-acid analogues are affected by the groups on the C atoms outside the lactone ring. The rate constants of the decomposition of the ascorbic acids are greater for molecules which exhibit *cis* arrangement of the H atoms on C atoms 4 and 5 than for those which have *trans* arrangement. A method is given for calculating rate constants in a reaction $A \rightarrow B \rightarrow C$ where only B can be experimentally determined.

541.127.1 : 539.4.019 : 678 1671

Determination of rate of cure for natural and synthetic rubber. COHAN, L. H., AND STEINBERG, M. *Industr. Engng Chem.* (*Analyt. Edit.*), 16, *pp.* 15–20, *Jan.* 15, 1944.—The tensile strength at a given marked undercure ÷ max. tensile is an index of rate of cure, the "tensile ratio." The proper undercure to use in calculating the tensile ratio is roughly 60% of the max. tensile, which for many stocks occurs at about 1/4 the time to reach max. tensile.

541.127.1 : 541.128.1 *see Abstr.* 1675

541.127.3 : 678.02 1672

Temperature coefficient of vulcanization of Buna S. CHEYNEY, LA V. E., AND DUNCAN, R. W. *Industr. Engng Chem.*, 36, *pp.* 33–36, *Jan.*, 1944.—Temp. coeff. were determined for 12 Buna S stocks over the range 270° to 300°F. The average values obtained from physical test data were 1·95 for a change of 10 deg. C. and 1·45 for a change of 10 deg. F. The corresp. values from combined sulphur data were 2·06 and 1·49, respectively.

541.128.1 1673

Catalysis of the interaction between hydrogen sulphide and sulphur dioxide by silver sulphide. RAO, B. S. *Curr. Sci.*, 12, *p.* 323, *Dec.*, 1943.

541.128.1 1674

Catalytic activity of silver sulphide. RAO, B. S., AND RAO, M. R. A. *Curr. Sci.*, 12, *pp.* 323–324, *Dec.*, 1944.

541.128.1 : 541.127.1 1675

Catalytic effect of acetate and phosphate buffers on the iodination of tyrosine. LI CHOH HAO. *J. Amer. Chem. Soc.*, 66, *pp.* 228–230, *Feb.*, 1944.—The catalytic effect of phosphate and acetate buffers in the reactions between iodine and tyrosine was investigated at 25°. In phosphate buffer, the sp. rate is $k_2 = 1{\cdot}0 \times 10^8(OH^-) + 150(HPO_4^=) + 12(H_2PO_4^-)$. In acetate buffer, the sp. rate is $\propto$ the ratio $(CH_3COO^-)/(H^+)$. The existence of a complex anion $CH_3C(OH)O_2^=$ as the catalytic agent is postulated.

541.128.1 : 678.7 : 541.127 *see Abstr.* 1667

541.128.3 1676

The catalytic action of natural mineral waters. II. CRONHEIM, G. *J. Phys. Chem.*, 47, *pp.* 638–645, *Dec.*, 1943.—The catalytic oxidation of formic acid by natural mineral waters and H_2O_2 was studied. The oxidation is started by the ferrous ions in the mineral water and continued by a chain mechanism. The main factors influencing this mechanism are the conc. of H_2O_2 and its dissociation as indicated by the *p*H of the solution. The addition of cupric salts greatly increases the rate of the reaction.

541.132 : 535.375.51 : 535.338.42 : 535.243 1677

The ionization of strong electrolytes. II. Ionization, Raman spectrum and vibrations of perchloric acid. REDLICH, O., HOLT, E. K., AND BIGELEISEN, J. *J. Amer. Chem. Soc.*, 66, *pp.* 13–16, *Jan.*, 1944.—[See Abstr. 292 (1944)]. A refined photographic method of comparing the intensities of spectral lines of unequal width was developed. The degrees of ionization of $HClO_4$ were determined. The Raman spectra of $HClO_4$ and conc. solutions of the acid and of $NaClO_4$ were measured. Fonteyne's interpretation of the vibration spectrum of the acid is revised and completed.

541.132.3 1678

Potentiometric measurements of hydrogen ion concentration in solutions of low dielectric constant. GEMANT, A. *J. Chem. Phys.*, 12, *pp.* 79–88, *March*, 1944.—Deals with solutions of *p*-toluene sulphonic acid and picric acid in xylene and dioxane. Parallel conductivity measurements complete the data. A type of cell has been tried in which the 2 solutions have not only different conc. but also different permittivity. Glass electrodes react reversibly with H ions in organic solvents of permittivity 2·3. Acids in such solvents behave as weak electrolytes. Deviations from the simple mass-action law are explainable on the basis of varying permittivity with varying electrolytic conc. H transf. numbers and approx. values for abs. ionic radii can be computed from combined conductivity and e.m.f. data.

541.132.3 : 532.13 : 532.613.4 : 541.182.4 *see Abstr.* 1693

541.132.3 : 541.18.025 1679

***p*H measurements on thixotropic gel systems using the glass electrode.** VOGEL, R. C., AND LISSE, M. W. *J. Phys. Chem.*, 47, *pp.* 678–685, *Dec.*, 1943.—During the primary gelations, $Fe(OH)_3$ and Th molybdate gel-forming systems showed *p*H changes, but a bentonite system showed no *p*H change. During thixotropic liquefaction or during secondary gelation, there is no *p*H change in the cases of Th molybdate, $Fe(OH)_3$ and a bentonite gel.

541.132.3 : 541.182 1680

Properties of detergent solutions. KUENTZEL, L. E., HENSLEY, J. W., AND BACON, L. R. *Industr. Engng Chem.*, 35, *pp.* 1286–1289, *Dec.*, 1943.—Improved apparatus for *p*H determination is described. *p*H data at 25°, 40° and 60°C. are presented for distilled water solutions of 9 commercial alkalies, incl. NaOH, Na_2CO_3, $NaHCO_3$, Na_3PO_4, $Na_4P_2O_7$, $Na_6P_4O_{13}$, Na_2SiO_3, Na_3SiO_4 and Na_4SiO_4. In general, multiple *p*H determinations check within 0·01 *p*H unit of the average. A linear equation and tables of constants provide for the calculation of *p*H values over the range 25°–60°C. for conc. 0·01, 0·1 and 1%. Thermal *p*H coefficients vary little with conc.

541.133 1681

The electrical conductivity of sodium and potassium guaiacolates in guaiacol. SHEDLOVSKY, T. *J. Gen. Physiol.*, 26, *pp.* 287–292, *Jan.*, 1943.—Previous (*J. Gen. Physiol.*, 17, 570, 1934) and new data on the conductivity of Na and of K guaiacolates in guaiacol at 25° have been computed with an improved conductance equation which is valid to somewhat higher concentrations than the equations formerly used. The new constants are $\Lambda_0 = 9{\cdot}0$, $K = 2{\cdot}8 \times 10^{-5}$ for Na guaiacolate, and $\Lambda_0 = 9{\cdot}5$, $K = 3{\cdot}4 \times 10^{-5}$ for K guaiacolate. C. J. G.

541.133 1682

The conductance of some salts in ethylenediamine. BROMLEY, W. H., JR., AND LUDER, W. F. *J. Amer. Chem. Soc.*, 66, *pp.* 107–109, *Jan.*, 1944.—The conductances of three salts, KI, AgI and $AgNO_3$ in ethylenediamine were measured, at conc. low enough to permit calculation of Λ_0 and *K*. The best solvent had a conductance of 9×10^{-8} mho. An explanation based on the electronic theory of acids and bases is offered for the low value of *K* for AgI.

541.133.1 : 578.087.87 : 576.311 1683

Diffusion potentials in models and in living cells. OSTERHOUT, W. J. *J. Gen. Physiol.*, 26, *pp.* 293–307, *Jan.*, 1943.—In studying living cells, potentials are measured and, from these, ionic mobilities are calculated. As a test, the method was applied to guaiacol treated as a living cell. The results justify the use of the method. C. J. G.

541.134 : 532.739.2 : 536.7 1684

A thermodynamic study of lead chloride in dioxane–water by means of electromotive-force and solubility data at 25°; the acetone-, ethanol-, dioxane-, glycerol–water–lead-chloride systems. NOBLE, M. V., AND GARRETT, A. B. *J. Amer. Chem. Soc.*, 66, *pp.* 231–235, *Feb.*, 1944.—The e.m.f. of the cell Pb(Hg)/$PbCl_2$/AgCl/Ag was measured at several conc. in 20, 40 and 60% dioxane–water mixtures. The solubility of $PbCl_2$ was determined in dioxane–water mixtures with added KCl and KNO_3. The solubility was

determined in alcohol–water, glycerol–water and acetone–water mixtures with no added salt present. The activity coefficients of $PbCl_2$ are calculated over a wide range of conc. The divergence in the slope of $-\log \gamma$ *v.* $\sqrt{\mu}$ is attributed to association. The solubility product constants are calculated for the 20, 40 and 60% mixtures of dioxane and water and for pure water.

541.135.5 1685

The structure of the collodion membrane and its electrical behaviour. IV–V. SOLLNER, K., AND CARR, C. W. *J. Gen. Physiol.*, 26, *pp.* 17–25, *Sept.*, 1942, *and pp.* 309–323, *Jan.*, 1943.—These instalments study the relative merits of the homogeneous phase theory and the micellar-structural theory as applied to the dried collodion membrane, and the influence of the thickness of dried collodion membranes upon their electromotive behaviour. C. J. G.

541.135.5 1686

The uses and limitations of membrane electrodes. MARSHALL, C. E. *J. Phys. Chem.*, 48, *pp.* 67–75, *March*, 1944.—An examination of assumptions made and errors encountered in the use of membrane electrodes leads to the conclusion that single cationic activities are determined with an uncertainty not exceeding 4% at ionic strengths $\simeq M/10$ and 2% at and below $M/100$. The special characteristics of clay membranes prepared by preheating films of montmorillonite and beidellite are described. By determining the mobility ratio of 2 cations within a given membrane, mixtures may be analysed. Such determinations are facilitated by the use of membranes sensitive to monovalent but not to divalent cations.

541.135.5 : 541.123.54 1687

The structure of the collodion membrane and its electrical behaviour. III. The base-exchange properties of collodion. SOLLNER, K., CARR, C. W., AND ABRAMS, I. *J. Gen. Physiol.*, 25, *pp.* 411–429, *Jan.*, 1942.—This paper attempts to determine whether or not a quantitative correlation exists between base-exchange capacity of collodion and its electrochemical activity as previously defined (*J. Gen. Physiol.*, 24, 467; 25, 7, 1941). The b.e. properties of a number of fibrous collodium preparations of different origins and after various types of treatment, having widely varying electrochemical activities, are determined. With the titration and electrometric methods employed, no regular correlation was found. The results are discussed and their bearing upon the problem of the spatial and electrical structure of the collodion membrane is briefly indicated. C. J. G.

541.144.8 : 547.238 1688

The photolysis of hydroxylamine. SMITH, R. N., AND LEIGHTON, P. A. *J. Amer. Chem. Soc.*, 66, *pp.* 172–177, *Feb.*, 1944.—The ultra-violet absorption spectrum of hydroxylamine vapour is continuous from 2 350 Å to 2 000 Å. Absorption in this region results in photolysis, the chief products being H_2, N_2 and H_2O. Some hydrazine is produced, the amount increasing in a flow system. The chief products of the thermal decomposition at room temperature are N_2, NO, N_2O, H_2O and NH_3. Small amounts of N_2O and NH_3 may result from the photolysis. For equal amounts of light absorbed, the rate of H formation decreases with increasing hydroxylamine pressure, and increases with the 3/2 power of the incident light intensity. A mechanism involving amino and hydroxyl radicals fits the data.

541.146 1689

Investigation of photochemical after-effect: the decomposition of hydrogen peroxide by potassium ferricyanide. LAL, B. B., AND SINGHAL, C. P. *Curr. Sci.*, 13, *pp.* 78–79, *March*, 1944.

541.18.025 : 541.132.3 *see Abstr.* 1679

541.182 : 532.133 : 537.36 *see Abstr.* 1614

541.182 : 532.694.1 1690

Mixed calcium salts of soaps and anionic detergents. MILES, G. D., AND ROSS, J. *Industr. Engng Chem.*, 35, *pp.* 1298–1301, *Dec.*, 1943.—Evidence is presented for the formation of mixed salts of Ca with fatty acids and synthetic anionic detergents. The *p*H limits necessary for the formation of these salts is discussed. Consideration of the formation of these mixed salts in mixtures containing sulphated detergents, soap and Ca salts leads to a plausible explanation of the decrease in both the foaming and detersive properties of such mixtures.

541.182 : 541.132.3 *see Abstr.* 1680

541.182 : 541.8 1691

Solubilization and the colloidal micelles in soap solution. MCBAIN, J. W., AND JOHNSON, K. E. *J. Amer. Chem. Soc.*, 66, *pp.* 9–13, *Jan.*, 1944.—The solubilization of water-insoluble dye by four K soaps was measured for equilibrium conditions over a range of concentrations. The solubilization increases so rapidly with the higher soaps as to cast doubt upon the suggestion that it is solution in the hydrocarbon fraction of the molecule, but rather to favour its incorporation between the layers of lamellar micelles. KCl increases the solubilizing power of fully formed micelles; it produces in dilute solution micelles of still higher solubilizing power.

541.182.046 1692

Influence of exchangeable ions on the dispersion of soil. SHUKLA, K. P. *Curr. Sci.*, 13, *p.* 45, *Feb.*, 1944.

541.182.4 : 532.613.4 : 532.13 : 541.132.3 1693

Pectin as an emulsifying agent. LOTZKAR, H., AND MACLAY, W. D. *Industr. Engng Chem.*, 35, *pp.* 1294–1297, *Dec.*, 1943.—Pectin as an emulsifying agent is compared with gums tragacanth, karaya and acacia in a study of aq. emulsions of olive, cottonseed and mineral oils under various conditions of acidity, ratio oil/water, and conc. of agent by measurement of changes with time in the sp. interfacial surface of the dispersed oil, *p*H, and viscosity.

541.182.4 : 532.692 = 3 *see Abstr.* 1555

541.182.5 : 535.551 = 3 *see Abstr.* 1590

541.182.6 : 535.341 *see Abstr.* 1578

541.183.022 : 539.13 : 547.962.3 : 535.417 = 3 *see Abstr.* 1588

541.183.2 : 536.658 : 547.458.6 1694

Water sorption by starches. SAIR, L., AND FETZER, W. R. *Industr. Engng Chem.*, 36, *pp.* 205–208, *March*, 1944.—Sorption isotherms were obtained for 7 starch varieties on samples subjected to intensive desiccation and on unheated controls. The varieties can be divided into 3 groups—cereal, pith or root, and

tuber. The sorptive capacity of a starch may be a measure of its deg. of association. The sorptive capacity of tuber starches can be reduced to values similar to those for cereal starches without causing injury or gelatinization of the granule. This has been accomplished by treatment of air-dried potato starch for 3 hr. with steam at 5 lb./in.^{2} This treatment alters the properties of the tuber starches.

541.183.26 : 532.63 : 532.612.4 *see Abstr.* 1547

541.183.5 1695

Folic acid. II. Studies on adsorption. FRIEDEN, E. H., MITCHELL, H. K., AND WILLIAMS, R. J. *J. Amer. Chem. Soc.*, 66, *pp.* 269–271, *Feb.*, 1944.—Quantitative studies of charcoal adsorption of folic acid from crude preparations and from concentrates with subsequent elutions are described. Elution of folic acid after adsorption from crude preparations is easier than from pure solutions. This is due to the presence of interfering substances which affect the manner of adsorption. A working hypothesis of the mechanism of adsorption is proposed. A study of the adsorption isotherms of folic acid, riboflavin and thiochrome upon charcoal at low conc. is reported. There is evidence that the adsorption process is of a dual nature.

541.183.56 1696

Correlating adsorption data. OTHMER, D. F., AND SAWYER, F. G. *Industr. Engng Chem.*, 35, *pp.* 1269–1276, *Dec.*, 1943.—Equilibrium v.p. of gas or vapour adsorbed on activated C or other substances are correlated with the temperatures of adsorption and the conc. of gas or vapour by the graphical method [Abstr. 2491 (1940)]. The equilibrium v.p. of an adsorbate out of a solid adsorbent are plotted against the normal v.p. of the same or a different material at corresp. temp. to give straight lines (isosteres) on a log. plot.

541.265 : 532.14 : 532.133 : 532.614 *see Abstr.* 1551

541.57 : 678 : 541.124 *see Abstr.* 1666

541.63 1697

Contribution to the stereochemistry of cryptoxanthin and zeaxanthin. ZECHMEISTER, L., AND LEMMON, R. M. *J. Amer. Chem. Soc.*, 66, *pp.* 317–322, *March*, 1944.—Earlier observations [Abstr. 436 (1943)] concerning neozeaxanthins were confirmed. Cryptoxanthin yielded 2 new stereoisomers, one of which is adsorbed above the all-*trans* compound on the Tswett column. In addition to previous methods, stereoisomerization also occurs upon the melting of crystals or exposure of solutions to sunshine. Zeaxanthin is more photosensitive than cryptoxanthin. Extinction curves are given for fresh, refluxed and iodine-catalysed solutions. Cryptoxanthin and zeaxanthin develop *cis*-peaks at 348 mμ (in benzene); however, no peak was observed upon iodine catalysis in darkness.

541.63 1698

A stereochemical study of methylbixin. ZECHMEISTER, L., AND ESCUE, R. B. *J. Amer. Chem. Soc.*, 66, *pp.* 322–330, *March*, 1944.—Besides labile methylbixin, now named natural methylbixin, and stable, termed all-*trans*, methylbixin, 2 other stereoisomers, neo A and C, have been isolated in crystals; several minor members of this set were observed in solution. The mutual conversion of the stereoisomers can be carried out by thermal methods, iodine catalysis or insolation. Natural and all-*trans*-methylbixins are practically not interconvertible by refluxing or exposure to sunshine. The reversible formation of neo C from natural methylbixin and of neo A from the all-*trans* form takes place easily under similar conditions. On the basis of spectroscopic data, especially *cis*-peak measurements, configurations are suggested for the 4 main observed methylbixins.

541.634 1699

***cis-trans* isomerization and *cis*-peak effect in the α-carotene set and in some other stereoisomeric sets.** ZECHMEISTER, L., AND POLGÁR, A. *J. Amer. Chem. Soc.*, 66, *pp.* 137–144, *Jan.*, 1944.—Ten *cis–trans* isomeric α-carotenes were observed which adsorb partly above, partly below the all-*trans* pigment in the Tswett column. Photo-isomerization experiments are described. The contribution of some stereoisomers to the *cis*-peak of the iodine equilibrium mixture was determined. Some spectral data served as a basis for a discussion of configurations.

541.634 : 535.343 1700

A spectroscopic study in the stereoisomeric capsanthin set. *cis*-peak effect and configuration. POLGÁR, A., AND ZECHMEISTER, L. *J. Amer. Chem. Soc.*, 66, *pp.* 186–190, *Feb.*, 1944.—The interaction of the carbonyl group of capsanthin with a polar solvent (ethanol) can be demonstrated by extinction curves. No fine structure of the fundamental band is observed in alcoholic solution. 2% alcohol in hexane causes the greater part of the change from the 0% to the 100% alcohol curve. The modification of the extinction curve upon stereoisomerization is similar to that observed with carotenoid hydrocarbons and alcohols. Upon iodine catalysis, a marked *cis*-peak develops at 363 mμ (in benzene) for which process light is needed. It is probable on the basis of spectroscopic data that neocapsanthin A contains one *cis* bond at the centre of the chromophore. This isomer should be assigned the configuration of 6-mono-*cis*-capsanthin. Neocapsanthin B is probably either 5-mono-*cis*, or 7-mono-*cis*-capsanthin. Neocapsanthin C is a di-*cis*-compound.

541.64 : 536.7 : 532.77 *see Abstr.* 1562

541.65 : 535.342 = 3 *see Abstr.* 1579

541.66 : 536.42 : 532.14 : 547.2 1701

The density and transition points of the *n*-paraffin hydrocarbons. SEYER, W. F., PATTERSON, R. F., AND KEAYS, J. L. *J. Amer. Chem. Soc.*, 66, *pp.* 179–182, *Feb.*, 1944.—The density measurements indicate that the structure in the liquid and solid states is the same for all members of the series. The odd-numbered C_{29} has a solid phase much less dense than the neighbouring even-numbered members. The transition points of C_{24} to C_{34} could be observed with either heating or cooling, while the transition points of C_{18}, C_{20} and C_{22} were observed only on cooling.

541.67 : 546.817.221 = 3 1702

On the electrical properties of lead sulphide. HINTENBERGER, H. *Z. Phys.*, 119, 1–2, *pp.* 1–21, 1942.—The conductivity, temp. coeff., thermo-e.m.f. and Hall const. were determined in relation to stoichiometric composition. Both with Pb and S in excess the conductivity increases. The extreme values are

$\sigma_{mm} = 6\times10^{-7}\,\Omega^{-1}$ cm.$^{-1}$, $\sigma_{Pb} = 20\,\Omega^{-1}$ cm.$^{-1}$, $\sigma_{rs} = 0{\cdot}6\,\Omega^{-1}$ cm.$^{-1}$ Thermo-e.m.f.'s between +700 and − 500 μV/deg. and Hall const. between + 156 and − 23 cm.^{3}/coulomb were measured. Vacuum treatment results in neg. and sulphur treatment in pos. values, pointing to semi-conduction excess and defect, respectively. The measured $R\sigma$ values lie between 0·5 and 5 cm./sec./V/cm. The temp. coeff. of the conductivity is affected by composition.

H. G. S.

541.68 : 677.31 : 539.216.1 *see Abstr.* 1639

541.8 : 541.182 *see Abstr.* 1691

542.1 : 531.76 *see Abstr.* 1540

542.2 1703

A reversible four-way stop-cock useful in work connected with circulation of gases and liquids. PURUSHOTHAM, A. *Curr. Sci.*, 13, *p.* 14, *Jan.*, 1944.

545.82 : 535.34 : 531.717.1 *see Abstr.* 1537

545.822 1704

Quantitative analysis for impurities by intensity estimation of one spectral line. PROKOFIEV, V. K., SVENITSKY, N. S., AND MAGAZINER, E. L. *C.R.* (*Doklady*) *Acad. Sci. URSS*, 34, 8, *pp.* 224–227, 1942.—By using an a.c. arc as the light source, spectral analysis by the method of abs. intensity yields quantitative estimations of impurities, of sufficient accuracy for industrial purposes. The accuracy was exemplified in a series of analyses for Pb in the alloy LS-59-1 (containing 0·95% Pb). The probable error was calculated from 100 determinations and found to be 5·2% for an individual measurement, giving 3% for an average of 3 measurements. A. E. T.

546.14 : 535.338.3 *see Abstr.* 1577

546.261 : 536.631 *see Abstr.* 1602

546.267 : 621.317.361 : 537.226.2 *see Abstr.* 1611

546.294 : 621.384.6 : 539.163.4 *see Abstr.* 1636

546.49 : 539.16.08 *see Abstr.* 1635

546.817.221 : 541.67 = 3 *see Abstr.* 1702

547.2 : 532.14 : 536.42 : 541.66 *see Abstr.* 1701

547.21 : 536.71 : 541.122 *see Abstr.* 1655

547.21 : 536.71 : 541.123.2 *see Abstr.* 1658

547.215 : 532.133 *see Abstr.* 1544

547.238 : 541.144.8 *see Abstr.* 1688

547.29 : 518.3 : 535.324 *see Abstr.* 1575

547.412 1705

Chlorohydrocarbon solvents. MCGOVERN, E. W. *Industr. Engng Chem.*, 35, *pp.* 1230–1239, *Dec.*, 1943.—Properties affecting commercial applications of the solvents are discussed, incl. flammability, stability, effect on common engineering metals, toxicity and selective solvent action. A table and charts summarizing physical data are presented. Applications are discussed, incl. dry cleaning, extraction and metal cleaning.

547.412.62 : 536 *see Abstr.* 1596

547.412.63 : 536.655 : 535.32 : 533.12 : 536.423.15 *see Abstr.* 1599

547.412.632.2 : 536 *see Abstr.* 1597

547.458.6 : 535.343 *see Abstr.* 1580

547.458.6 : 536.658 : 541.183.2 *see Abstr.* 1694

547.458.81 : 537.533.72 : 539.216.1 = 3 *see Abstr.* 1637

547.458.81 : 537.533.9 : 539.216.1 = 3 *see Abstr.* 1640

547.458.81 : 541.124 : 539.216.1 : 539.26 = 3 *see Abstr.* 1647

547.962.3 : 539.13 : 541.183.022 : 535.417 = 3 *see Abstr.* 1588

547.979.7 : 535.372 *see Abstr.* 1582

548.0 1706

The crystal structure of potassium silver carbonate, $KAgCO_3$. DONOHUE, J., AND HELMHOLZ, L. *J. Amer. Chem. Soc.*, 66, *pp.* 295–298, *Feb.*, 1944.—The crystal is orthorhombic holohedral, with $a_0 = 20{\cdot}23$ Å, $b_0 = 5{\cdot}75$ Å, $c_0 = 5{\cdot}95$ Å. The space group is D_{2h}^{27}-*Ibca*. The Ag-O bond distance is 2·42 Å, and this is discussed in rel. to other silver salts.

548.0 : 539.211 : 535.417 *see Abstr.* 1587

548.0 : 553.621 : 537.228.1 1707

Quartz crystals—development and application. BOKOVOY, S. A. *Elect. Commun.*, 21, 4, *pp.* 233–246, 1944.—Describes the piezo-electric effect and the use of quartz for crystal oscillations. The sources of quartz, the selection of suitable specimens and the preparation of quartz oscillators through the various stages from raw quartz onwards are also described. The effect of the orientation on activity and temperature stability is discussed. J. T.

548.1 1708

Configurations of a binary mixed crystal. EISENSCHITZ, R. *Phys. Rev.*, 65, *pp.* 204–205, *March* 1 *and* 15, 1944.—[See Abstr. 315 (1944)].

548.1 : 513.3 1709

A model of the structure of Rochelle salt. PLEASONTON, F. *Amer. J. Phys.*, 12, *pp.* 19–22, *Feb.*, 1944.

548.73 1710

Ambiguities in the X-ray analysis of crystal structures. PATTERSON, A. L. *Phys. Rev.*, 65, *pp.* 195–201, *March* 1 *and* 15, 1944.—The intensities of the X-ray reflections depend on the vector distances between the atoms and not directly on the co-ordinates. A number of cases is presented in which 2, and sometimes 3 or 4, non-congruent sets of points are homometric, i.e. have the same vector distance set. There are families of non-cyclotomic pairs and multiplets and each of these families has its counterpart in 2 and 3 dimensions. The significance of these results for practical crystal analysis is discussed.

548.73 : 539.384 1711

Study of the bent of quartz crystals with the help of a Cauchois spectrograph. WAINSTEIN, E. *C.R.* (*Doklady*) *Acad. Sci. URSS*, 34, 4–5, *pp.* 107–109, 1942.—Describes a study of the concave reflecting crystal, which involves the taking of photographs of X-ray spectra far behind or before the focus of the spectrograph [see Abstr. 751 (1938)]. An explanation of the phenomenon is sought in terms of the actual mechanism of the deformation of the crystal in the crystal-holder of the spectrograph. A. E. T.

548.74 : 539.234 = 3 *see Abstr.* 1645, 1646

550.312(764) 1712

Correlation of gravity observations with the geology of the Smoothingiron Granite Mass, Llano County, Texas. ROMBERG, F., AND BARNES, V. E. *Geophysics*, 9, *pp.* 79–93, *Jan.*, 1944.—Gravitational

observations were made and the geology mapped. The observed gravitational anomaly is interpreted to give depth and a subsurface shape for the mass. Maps are provided showing the gravity contours and the geology, and geological and mathematical appendices are added.

550.381 1713

List of geomagnetic observatories and thesaurus of values. IV. FLEMING, J. A., AND SCOTT, W. E. *Terr. Magn. Atmos. Elect.*, 49, *pp.* 47–52, *March*, 1944.

550.384 : 523.746 1714

Solar and magnetic data, October to December, 1943, Mount Wilson Observatory. NICHOLSON, S. B., AND MULDERS, E. S. *Terr. Magn. Atmos. Elect.*, 49, *pp.* 63–64, *March*, 1944.

550.385 1715

Principal magnetic storms October to December, 1943. *Terr. Magn. Atmos. Elect.*, 49, *pp.* 65–68, *March*, 1944.

550.389 1716

American magnetic character-figure, C_A, three-hour-range indices, K, and mean K-indices, K_A, for October to December, 1943, and summary for year 1943. JOHNSTON, H. F. *Terr. Magn. Atmos. Elect.*, 49, *pp.* 53–61, *March*, 1944.

550.389 1717

Preliminary magnetic character-figures, C, for 1942 and lists of five selected quiet and disturbed days for January to June, 1943. JOHNSTON, H. F. *Terr. Magn. Atmos. Elect.*, 49, *pp.* 62–63, *March*, 1944.

550.836 1718

Contribution to the theory of thermic prospecting. KOVNER, S. S. *C.R.* (*Doklady*) *Acad. Sci. URSS*, 32, 6, *pp.* 397–399, 1941.—It is important to be able to calculate the effect of a foreign inclusion on the heat flow through the surrounding homogeneous medium. This paper indicates a method of calculation which can be applied to inclusions of arbitrary shape. As an example, the method is applied to delineating the thermal field of a salt dome, and the results are compared with those which would be expected from thermal prospecting at depths of 250, 125 and 62·5 m. respectively. A. E. T.

550.837.2 1719

Topography's effect in the equipotential line method. HURD, C. O. *Min. Mag.*, 34, *pp.* 15–18, 39 *and* 41, *Jan.*, 1944.—Tests are described to determine, by a bridge method, the potential distribution between two wire electrodes in a test tank filled with clay. The effect of hills and depressions of various shapes is investigated and the resulting fields are plotted. The possible disturbing effects of such topographic features on the detection of a buried ore body are discussed. R. H. G.

550.837.3 1720

Sand and gravel prospecting by the earth-resistivity method. WILCOX, S. W. *Geophysics*, 9, *pp.* 36–46, *Jan.*, 1944.—The 4-electrode earth-resistivity method is applied to the search for sand and gravel deposits in the glaciated areas of the U.S. This technique differentiates between clays and granular materials, enabling the prospector to outline and roughly estimate the quantities of each without test pits or bore holes. Several examples of field surveys are given.

551.508.71 1721

Humid fatigue of hygrometers. MAHAJAN, L. D. *Curr. Sci.*, 13, *pp.* 73–74, *March*, 1944.

552.524 : 624.131 : 539.388.8 *see Abstr.* 1652

553.621 : 537.228.1 : 548.0 *see Abstr.* 1707

576.311 : 578.087.87 : 541.133.1 *see Abstr.* 1683

577.15.037 : 537.36 *see Abstr.* 1616

578.087.87 : 576.311 : 541.133.1 *see Abstr.* 1683

591.473 : 539.3 *see Abstr.* 1649

591.481.1.087.87 1722

Multiple electrode holder for the Horsley–Clarke instrument. WALLER, W. H. *Science*, 99, *p.* 226, *March* 17, 1944.

624.131 : 552.524 : 539.388.8 *see Abstr.* 1652

661.713 : 536.658 : 539.388.8 *see Abstr.* 1651

661.713 : 537.311 : 537.36 *see Abstr.* 1615

661.713 : 539.388.8 *see Abstr.* 1653

669 : 539.26 *see Abstr.* 1648

669.018 : 541.123.3 *see Abstr.* 1661

676 : 539.217 *see Abstr.* 1641

677.31 : 541.68 : 539.216.1 *see Abstr.* 1639

678 : 539.4.019 : 541.127.1 *see Abstr.* 1671

678 : 541.57 : 541.124 *see Abstr.* 1666

678/679 : 539.37 *see Abstr.* 1650

678.02 : 541.127.3 *see Abstr.* 1672

678.7 : 536.666 *see Abstr.* 1608

678.7 : 541.128.1 : 541.127 *see Abstr.* 1667

679.5 1723

Synthetic optical material "Transpex." *Brit. Plast. Mould. Prod. Tr.*, 16, *pp.* 170–171, *April*, 1944.—Gives notes on 2 new materials developed by I.C.I. The first is a specially prepared unplasticized polymethyl methacrylate and the second unplasticized polystyrene. The workability of the materials is indicated, and a table of physical properties is given. E. R. A.

679.5 : 536.413 *see Abstr.* 1598

679.5 : 539.501 *see Abstr.* 1654

778.1 1724

Safeguarding of essential records by photography. WICKENS, W. R. *P.O. Elect. Engrs' J.*, 37, *pp.* 17–21, *April*, 1944.—Photographic methods for the safeguarding of essential records have been adopted by the P.O. Engineering Dept. The author describes the apparatus used for photographing and reproducing card records and linen tracings.